ENGINEERING TEST REPORT

BlackBerry Presenter
Model No.: RCR11BW (Marketing M/N: BP-100)
FCC ID: L6ARCR10BW

Applicant:

Research In Motion Limited
295 Phillip St.
Waterloo, ON
Canada, N2L 3W8

In Accordance With

Federal Communications Commission (FCC)
Part 15, Subpart C, Section 15.247
Frequency Hopping System and DTS
Operating in 2402-2480 MHz Band

UltraTech's File No.: RIM-029F15C247

This Test report is Issued under the Authority of Tri M. Luu, Professional Engineer, Vice President of Engineering UltraTech Group of Labs Date: October 7, 2009	
Report Prepared by: JaeWook Choi Issued Date: October 7, 2009	Tested by: Hung Trinh, RFI Technician Test Dates: September 10, 14~15, 18 and 21~24, 2009 October 7, 2009

- *The results in this Test Report apply only to the sample(s) tested, and the sample tested is randomly selected.*
- *This report must not be used by the client to claim product endorsement by NVLAP or any agency of the US Government.*

UltraTech Group of Labs

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EXHIBIT 1. INTRODUCTION

1.1. SCOPE

Reference:	FCC Part 15, Subpart C, Section 15.247
Title:	Code of Federal Regulations (CFR), Title 47 – Telecommunication, Part 15
Purpose of Test:	Equipment Certification for Frequency Hopping System Transmitter Operating in the Frequency Band 2402-2480 MHz
Test Procedures:	Both conducted and radiated emissions measurements were conducted in accordance with American National Standards Institute ANSI C63.4 - American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
Environmental Classification:	[ ] Commercial, industrial or business environment [x] Residential environment

1.2. RELATED SUBMITTAL(S)/GRANT(S)

None.

1.3. NORMATIVE REFERENCES

Publication	Year	Title
47 CFR Parts 0-19	2008	Code of Federal Regulations – Telecommunication
ANSI C63.4	2003	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
CISPR 22 & EN 55022	2006 2006	Information Technology Equipment - Radio Disturbance Characteristics – Limits and Methods of Measurement
CISPR 16-1-1 +A1 +A2	2006 2006 2007	Specification for radio disturbance and immunity measuring apparatus and methods. Part 1-1: Measuring Apparatus
CISPR 16-1-2 +A1 +A2	2003 2004 2006	Specification for radio disturbance and immunity measuring apparatus and methods. Part 1-2: Conducted disturbances
KDB Publication No. 558074	2005	Guidance on Measurements for Digital Transmission Systems (47 CFR 15.247)
KDB Publication No. 447498	2008	Mobile and Portable Device RF Exposure Procedure and Equipment Authorization Policies

EXHIBIT 2. PERFORMANCE ASSESSMENT

2.1. CLIENT INFORMATION

APPLICANT	
Name:	Research In Motion Limited
Address:	295 Phillip St. Waterloo, ON Canada, N2L 3W8
Contact Person:	Mr. Masud Attayi Phone #: 1.519.888.7465 Email Address: mattayi@rim.com

MANUFACTURER	
Name:	Research In Motion Limited
Address:	295 Phillip St. Waterloo, ON Canada, N2L 3W8
Contact Person:	Mr. Don Thompson Phone #: 1.519.888.7465 x 75407 Email Address: dthompson@rim.com

2.2. EQUIPMENT UNDER TEST (EUT) INFORMATION

The following information (with the exception of the Date of Receipt) has been supplied by the applicant.

Brand Name	Research In Motion Limited
Product Name:	BlackBerry Presenter
Model Name or Number:	RCR11BW (Marketing M/N: BP-100)
Serial Number:	Test Sample
Type of Equipment:	BlackBerry Presenter
Input Power Supply Type:	5 VDC AC Power adapter
Primary User Functions of EUT:	Connect to the BlackBerry via Bluetooth and present presentations using monitor or projector using the VGA or S-Video output.

2.3. EUT'S TECHNICAL SPECIFICATIONS

BLUETOOTH TRANSMITTER		
Equipment Type:	Base station	
Intended Operating Environment:	Residential environment	
Power Supply Requirement:	5 VDC	
RF Output Power Rating:	10 dBm (10 mW)	
Operating Frequency Range:	2402-2480 MHz	
Duty Cycle:	9.375 % (worst case)	
20 dB Bandwidth:	929.9 KHz for GFSK modulation 1.3908 MHz for π/4 DPQSK modulation 1.3868 MHz for 8DPSK modulation	
Modulation Type:	G1D	
Antenna Connector Type:	Integral antenna housed inside the enclosure.	
Antenna Description:	Manufacturer: Type Model Gain: Frequency Range:	RIM Printed PCB N/A 0 dBi 2400 ~ 2583.5 MHz

2.4. LIST OF EUT'S PORTS

Port Number	EUT's Port Description	Number of Identical Ports	Connector Type
1	USB (DC Power)	1	Micro USB
2	VESA (VGA)	1	VGA
3	S-VIDEO	1	S-VIDEO

2.5. ANCILLARY EQUIPMENT

The EUT was tested while connected to the following representative configuration of ancillary equipment necessary to exercise the ports during tests:

Ancillary Equipment # 1	
Description:	AC Power Adapter
Brand Name:	Research In Motion
Model Name or Number:	PSM04A0-050RIM (NY) or PSM04A0-050CHW1 (M)
Serial Number:	N/A
Cable Length & Type:	< 3 m, Non-shielded
Connected to EUT's Port:	USB

2.6. General Block Diagram

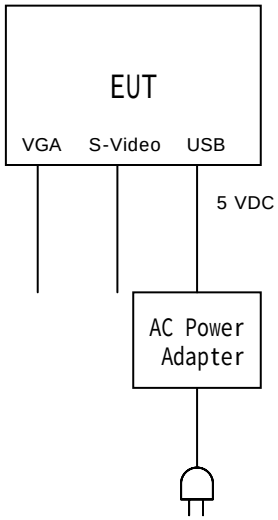


EXHIBIT 3. EUT OPERATING CONDITIONS AND CONFIGURATIONS DURING TESTS

3.1. CLIMATE TEST CONDITIONS

The climate conditions of the test environment are as follows:

Temperature:	21°C
Humidity:	51%
Pressure:	102 kPa

3.2. OPEPERATIONAL TEST CONDITIONS & ARRANGEMENT FOR TESTS

Operating Modes:	For testing purpose only, the EUT was set to transmit continuously by setting the unit into the 1st test state.
Special Test Software:	None.
Special Hardware Used:	None.
Transmitter Test Antenna:	The EUT is tested with the antenna fitted in a manner typical of normal intended use as integral antenna equipment.

Transmitter Test Signals	
Frequency Band(s):	2402-2480 MHz
RF Power Output:	9.36 dBm e.i.r.p. for GFSK modulation, 8.99 dBm e.i.r.p. for π/4 DPQSK modulation, and 9.71 dBm e.i.r.p. for 8DPSK modulation
Normal Test Modulation:	GFSK, π/4 DPQSK and 8DPSK
Modulating Signal Source:	Internal

EXHIBIT 4. SUMMARY OF TEST RESULTS

4.1. LOCATION OF TESTS

All of the measurements described in this report were performed at Ultratech Group of Labs located in the city of Oakville, Province of Ontario, Canada.

Power Line Conducted Emissions were performed in UltraTech's shielded room, 16'(L) by 12'(W) by 12'(H).

Radiated Emissions were performed at the Ultratech's 3-10 TDK Semi-Anechoic Chamber situated in the Town of Oakville, province of Ontario. This test site been calibrated in accordance with ANSI C63.4, and found to be in compliance with the requirements of Sec. 2.948 of the FCC Rules. The descriptions and site measurement data of the Oakville 3-10 TDK Semi-Anechoic Chamber has been filed with FCC office (FCC File No.: 91038) and Industry Canada office (Industry Canada File No.: 2049A-3). Expiry Date: 2011-05-01.

4.2. APPLICABILITY & SUMMARY OF EMC EMISSION TEST RESULTS

FCC Section(s)	Test Requirements	Compliance (Yes/No)
2.1091	Radiofrequency radiation exposure evaluation: mobile devices	Yes
15.207(a)	Power Line Conducted Emissions	Yes
15.247(a)(1)	Hopping Frequency Separation	Yes
15.247(a)(1)(iii)	Number of Hopping Channels and Average Time of Occupancy	Yes
15.247(b)(1)	Peak Output Power	Yes
15.247(d)	Band-Edge and RF Conducted Spurious Emissions at the Transmitter Antenna Terminal	Yes
15.247(d), 15.209 & 15.205	Transmitter Spurious Radiated Emissions	Yes
15.247(d) & 15.247(f)	Peak Power Spectral Density	Yes
BlackBerry Presenter, **Model No.: RCR11BW (Marketing M/N: BP-100)**, by **Research In Motion Limited** has also been tested and found to comply with **FCC Part 15, Subpart B - Class B Digital Devices**. The engineering test report has been documented and kept on file and it is available upon request.		

4.3. MODIFICATIONS INCORPORATED IN THE EUT FOR COMPLIANCE PURPOSES

None.

EXHIBIT 5. MEASUREMENTS, EXAMINATIONS & TEST DATA FOR EMC EMISSIONS

5.1. TEST PROCEDURES

This section contains test results only. Details of test methods and procedures can be found in ANSI C63.4; FCC KDB Publication No. 558074: Guidance on Measurements for Digital Transmission Systems.

5.2. MEASUREMENT UNCERTAINTIES

The measurement uncertainties stated were calculated in accordance with requirements of UKAS Document NIS 81 with a confidence level of 95%. Please refer to EXHIBIT 6. for Measurement Uncertainties.

5.3. MEASUREMENT EQUIPMENT USED

The measurement equipment used complied with the requirements of the Standards referenced in the Methods & Procedures ANSI C63.4 and CISPR 16-1-1.

5.4. ESSENTIAL/PRIMARY FUNCTIONS AS DECLARED BY THE MANUACTURER

The BlackBerry Presenter is a Bluetooth enabled device that is used to display presentations from BlackBerry device on an external display, such as video projector or television screen.

5.5. RF EXPOSURE REQUIREMENTS [§§ 1.1310 & 2.1091]

5.5.1. Limits

§ **1.1310:** The criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in 1.1307(b).

LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Average Time (minutes)
(B) Limits for General Population/Uncontrolled Exposure				
30-300	27.5	0.073	0.2	30
300-1500	--	--	f/1500	30
1500-100,000	--	--	1.0	30

Note: f is frequency in MHz

5.5.2. Method of Measurements

Calculation Method of RF Safety Distance:

$$S = \frac{PG}{4\pi \cdot r^2} = \frac{EIRP}{4\pi \cdot r^2}$$

Where, P: power input to the antenna in mW
EIRP: Equivalent (effective) isotropic radiated power.
S: power density mW/cm^2
G: numeric gain of antenna relative to isotropic radiator
r: distance to centre of radiation in cm

5.5.3. Evaluation of RF Exposure Compliance Requirements

Maximum RF Power conducted, $\mathbf{P_{conducted}[dBm]}$ = 9.71 at 2402 MHz

Maximum Antenna Gain, **G[dBi]** = 0.0

Maximum EIRP, $\mathbf{P_{EIRP}[dBm]}$ = 9.71

MPE Limit for General Population/Uncontrolled Exposure, $\mathbf{S_{uncontrolled}[mW/cm^2]}$ = 1.0

MPE estimation at Safety Distance of 20 cm, $\mathbf{S_{@20cm}[mW/cm^2]}$ = 0.000174

5.6. POWER LINE CONDUCTED EMISSIONS [§ 15.207(a)]

5.6.1. Limits

The equipment shall meet the limits of the following table:

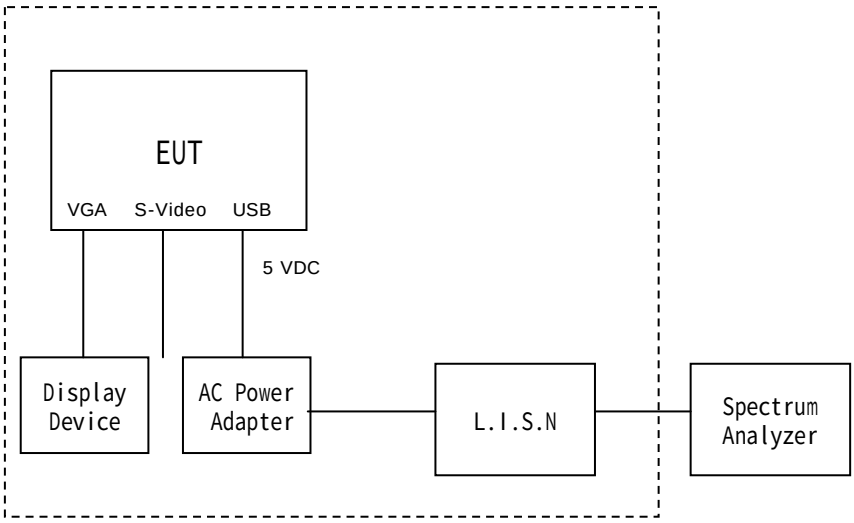
Frequency of Emissions (MHz)	Class B Conducted Limit (dBµV)	
	Quasi-Peak	Average
0.15 to 0.5	66 to 56*	56 to 46*
0.5 to 5	56	46
5 to 30	60	50

* Decreasing linearly with logarithm of frequency

5.6.2. Method of Measurements

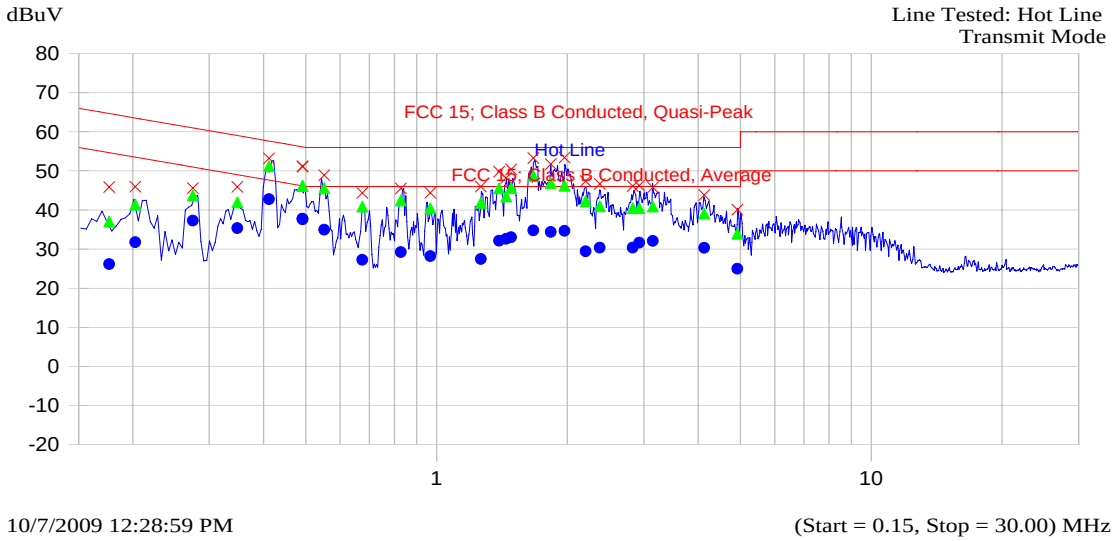
Refer to Ultratech Test Procedures ULTR-P001-200 & ANSI C63.4 for method of measurements.

5.6.3. Test Arrangement



5.6.4. Test Data

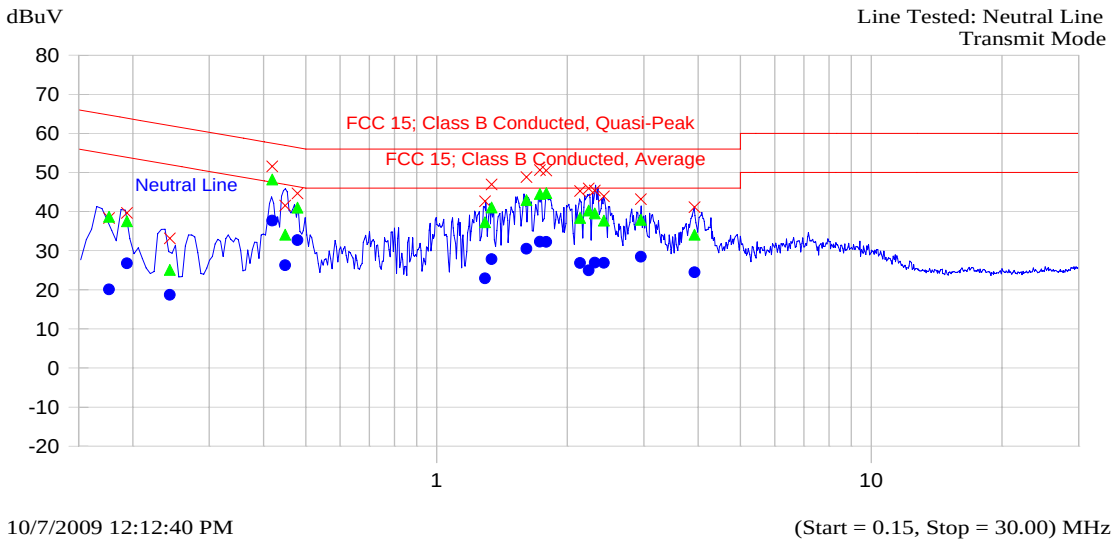
5.6.4.1. 120 VAC, Line Tested: Hot
AC Power Adapter M/N: PSM04A0-050RIM (NY)



Current List

Frequency MHz	Peak dBuV	QP dBuV	Delta QP-QP Limit dB	Avg dBuV	Delta Avg-Avg Limit dB	Trace Name
0.176	45.9	37.0	-28.2	26.1	-29.1	Hot Line
0.203	46.0	41.4	-23.1	31.7	-22.7	Hot Line
0.275	45.6	43.7	-18.7	37.3	-15.1	Hot Line
0.348	45.9	42.0	-18.3	35.3	-14.9	Hot Line
0.412	53.2	51.2	-7.3	42.8	-5.7	Hot Line
0.492	51.0	46.1	-10.1	37.6	-8.6	Hot Line
0.491	51.2	46.1	-10.1	37.7	-8.5	Hot Line
0.551	48.9	45.5	-10.5	34.9	-11.1	Hot Line
0.675	44.3	40.8	-15.2	27.3	-18.7	Hot Line
0.828	45.5	42.4	-13.6	29.2	-16.8	Hot Line
0.967	44.4	40.4	-15.6	28.2	-17.8	Hot Line
1.264	46.0	41.8	-14.2	27.5	-18.5	Hot Line
1.392	49.8	45.5	-10.5	32.1	-13.9	Hot Line
1.446	48.2	43.4	-12.6	32.6	-13.4	Hot Line
1.484	50.4	45.6	-10.4	33.0	-13.0	Hot Line
1.669	53.3	48.7	-7.3	34.8	-11.2	Hot Line
1.831	51.7	46.9	-9.1	34.4	-11.6	Hot Line
1.971	53.4	46.2	-9.8	34.6	-11.4	Hot Line
2.203	47.4	42.2	-13.8	29.4	-16.6	Hot Line
2.373	46.6	41.0	-15.0	30.4	-15.6	Hot Line
2.827	46.1	40.5	-15.5	30.4	-15.6	Hot Line
2.925	46.2	40.5	-15.5	31.6	-14.4	Hot Line
3.142	45.7	40.9	-15.1	32.1	-13.9	Hot Line
4.130	43.8	39.1	-16.9	30.3	-15.7	Hot Line
4.922	40.0	33.9	-22.1	25.0	-21.0	Hot Line

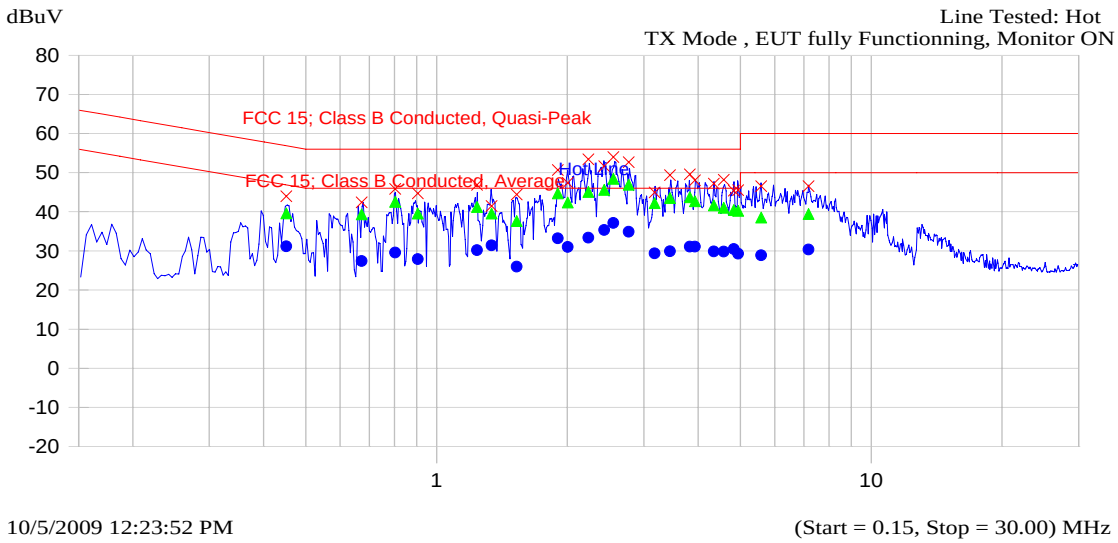
5.6.4.2. 120 VAC, Line Tested: Neutral
AC Power Adapter M/N: PSM04A0-050RIM (NY)



Current List

Frequency MHz	Peak dBuV	QP dBuV	Delta QP-QP Limit dB	Avg dBuV	Delta Avg-Avg Limit dB	Trace Name
0.176	38.3	38.6	-26.6	20.1	-35.1	Neutral Line
0.194	39.7	37.5	-27.2	26.7	-28.0	Neutral Line
0.243	33.1	25.1	-38.2	18.7	-34.6	Neutral Line
0.419	51.5	48.2	-10.1	37.7	-10.6	Neutral Line
0.448	41.5	34.1	-23.4	26.2	-21.2	Neutral Line
0.479	44.6	41.0	-15.6	32.7	-13.9	Neutral Line
1.292	42.6	37.3	-18.7	22.9	-23.1	Neutral Line
1.338	46.9	41.0	-15.0	27.9	-18.1	Neutral Line
1.610	48.8	42.9	-13.1	30.5	-15.5	Neutral Line
1.729	50.6	44.5	-11.5	32.3	-13.7	Neutral Line
1.788	50.5	44.7	-11.3	32.3	-13.7	Neutral Line
2.138	45.3	38.4	-17.6	26.8	-19.2	Neutral Line
2.239	45.9	40.2	-15.8	24.9	-21.1	Neutral Line
2.313	45.4	39.5	-16.5	26.9	-19.1	Neutral Line
2.426	43.9	37.7	-18.3	26.9	-19.1	Neutral Line
2.951	43.2	37.9	-18.1	28.4	-17.6	Neutral Line
3.920	41.1	34.1	-21.9	24.5	-21.5	Neutral Line

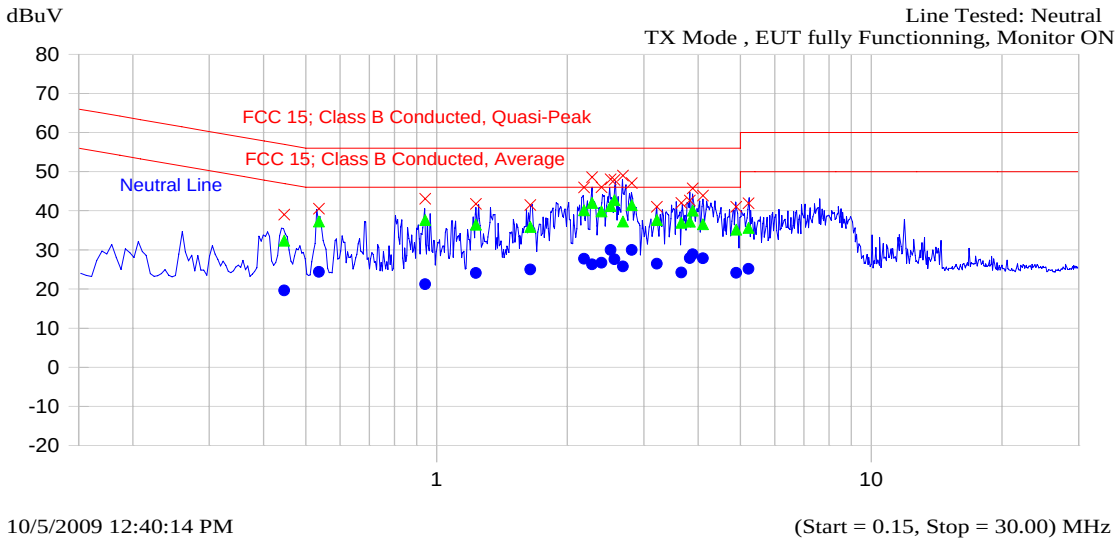
5.6.4.3. 120 VAC, Line Tested: Hot
AC Power Adapter M/N: PSM04R-050CHW1 (M)



Current List

Frequency MHz	Peak dBuV	QP dBuV	Delta QP-QP Limit dB	Avg dBuV	Delta Avg-Avg Limit dB	Trace Name
0.451	43.9	39.6	-17.8	31.2	-16.2	Hot Line
0.672	42.4	39.3	-16.7	27.4	-18.6	Hot Line
0.803	45.8	42.5	-13.5	29.6	-16.4	Hot Line
0.906	44.7	39.5	-16.5	27.9	-18.1	Hot Line
1.240	46.9	41.2	-14.8	30.2	-15.8	Hot Line
1.338	41.5	39.6	-16.4	31.4	-14.6	Hot Line
1.529	44.4	37.6	-18.4	26.0	-20.0	Hot Line
1.901	50.6	44.7	-11.3	33.2	-12.8	Hot Line
2.003	47.4	42.4	-13.6	31.0	-15.0	Hot Line
2.236	53.4	45.1	-10.9	33.4	-12.6	Hot Line
2.430	51.6	45.6	-10.4	35.3	-10.7	Hot Line
2.552	54.0	48.4	-7.6	37.1	-8.9	Hot Line
2.768	52.6	46.9	-9.1	34.9	-11.1	Hot Line
3.174	44.9	42.2	-13.8	29.3	-16.7	Hot Line
3.443	49.4	43.5	-12.5	29.9	-16.1	Hot Line
3.824	49.6	43.7	-12.3	31.1	-14.9	Hot Line
3.932	48.1	42.7	-13.3	31.1	-14.9	Hot Line
4.344	47.2	41.6	-14.4	29.8	-16.2	Hot Line
4.579	48.2	41.0	-15.0	29.8	-16.2	Hot Line
4.831	45.4	40.5	-15.5	30.5	-15.5	Hot Line
4.940	45.5	40.2	-15.8	29.3	-16.7	Hot Line
5.581	46.5	38.5	-21.5	28.8	-21.2	Hot Line
7.175	46.5	39.4	-20.6	30.3	-19.7	Hot Line

5.6.4.4. 120 VAC, Line Tested: Neutral
AC Power Adapter M/N: PSM04R-050CHW1 (M)



Current List

Frequency MHz	Peak dBuV	QP dBuV	Delta QP-QP Limit dB	Avg dBuV	Delta Avg-Avg Limit dB	Trace Name
0.446	39.0	32.4	-25.1	19.6	-27.9	Neutral Line
0.536	40.5	37.2	-18.8	24.4	-21.6	Neutral Line
0.941	43.0	37.6	-18.4	21.2	-24.8	Neutral Line
1.232	41.7	36.5	-19.5	24.1	-21.9	Neutral Line
1.644	41.5	35.8	-20.2	25.0	-21.0	Neutral Line
2.184	46.0	40.1	-15.9	27.7	-18.3	Neutral Line
2.278	48.6	42.0	-14.0	26.3	-19.7	Neutral Line
2.397	46.0	39.8	-16.2	26.7	-19.3	Neutral Line
2.513	48.0	41.2	-14.8	30.0	-16.0	Neutral Line
2.567	47.9	42.7	-13.3	27.6	-18.4	Neutral Line
2.684	49.0	37.2	-18.8	25.7	-20.3	Neutral Line
2.813	47.1	41.4	-14.6	30.0	-16.0	Neutral Line
3.214	41.0	37.6	-18.4	26.5	-19.5	Neutral Line
3.660	42.0	36.9	-19.1	24.2	-21.8	Neutral Line
3.824	42.6	37.2	-18.8	27.9	-18.1	Neutral Line
3.886	45.7	40.0	-16.0	28.9	-17.1	Neutral Line
4.101	43.9	36.5	-19.5	27.8	-18.2	Neutral Line
4.891	41.0	35.2	-20.8	24.1	-21.9	Neutral Line
5.222	41.9	35.6	-24.4	25.1	-24.9	Neutral Line

5.7. COMPLIANCE WITH FCC PART 15 – GENERAL TECHNICAL REQUIREMENTS

FCC Section	FCC Rules	Manufacturer's Clarification
15.31(m)	The hoping function must be disabled for tests, which should be performed with the EUT transmitting on the number of frequencies specified in this Section. The measurements made at the upper and lower ends of the band of operation should be made with the EUT tuned to the highest and lowest available channels.	Hoping function was disabled for the required tests at low, middle and high channels.
15.203	Described how the EUT complies with the requirement that either its antenna is permanently attached, or that it employs a unique antenna connector, for every antenna proposed for use with the EUT. The exception is in those cases where EUT must be professionally installed. In order to demonstrate that professional installation is required, the following 3 points must be addressed: ➢ The application (or intended use) of the EUT ➢ The installation requirements of the EUT ➢ The method by which the EUT will be marketed	The antenna is integrated or employs unique antenna connectors: Integral PCB antenna
15.204	Provided the information for every antenna proposed for use with the EUT: ➢ type (e.g. Yagi, patch, grid, dish, etc…), ➢ manufacturer and model number ➢ gain with reference to an isotropic radiator	Manufacturer: RIM Type: PCB Model: N/A Freq. Range: 2402 ~ 2583.5 MHz Gain: 0 dBi
15.247(a)	Description of how the EUT meets the definition of a frequency hopping spread spectrum, found in Section 2.1. Based on the technical description.	Bluetooth device
15.247(a)	Pseudo Frequency Hopping Sequence: Describe how the hopping sequence is generated. Provide an example of the hopping sequence channels, in order to demonstrate that the sequence meets the requirements specified in the definition of a frequency hopping spread spectrum system, found in Section 2.1	Bluetooth device

FCC Section	FCC Rules	Manufacturer's Clarification
15.247(a)	Equal Hopping Frequency Use: Describe how each individual EUT meets the requirement that each of its hopping channels is used equally on average (e.g. that each new transmission event begins on the next channel in the hopping sequence after final channel used in the previous transmission events).	Bluetooth device
15.247(g)	Describe how the EUT complies with the requirement that it be designed to be capable of operating as a true frequency hopping system	Bluetooth device
15.247(h)	Describe how the EUT complies with the requirement that it not have the ability to coordinated with other FHSS is an effort to avoid the simultaneous occupancy of individual hopping frequencies by multiple transmitters	Bluetooth device
Public Notice DA 00-705	System Receiver Input Bandwidth: Describe how the associated receiver(s) complies with the requirement that its input bandwidth (either RF or IF) matches the bandwidth of the transmitted signal.	Bluetooth device
Public Notice DA 00-705	System Receiver Hopping Capability: Describe how the associated receiver(s) has the ability to shift frequencies in synchronization with the transmitted signals	Bluetooth device

5.8. PROVISIONS FOR FREQUENCY HOPPING SYSTEMS [§ 15.247(a)(1)]

5.8.1. Limit

§ 15.247(a)(1): Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2402-2480 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudorandomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

5.8.2. Method of Measurements

FCC Public Notice DA 00-705

Carrier Frequency Separation:

The hopping function of the EUT is enabled. Use the spectrum analyzer setting as follows:

- Span = wide enough to capture the peaks of two adjacent channels
- RBW = 1% of the span
- VBW ≥ RBW
- Sweep = Auto
- Detector = peak
- Trace = max hold

Number of hopping frequency:

The hopping function of the EUT is enabled. Use the spectrum analyzer setting as follows:

- Span = the frequency band of operation
- RBW = 1% of the span
- VBW ≥ RBW
- Sweep = Auto
- Detector = peak
- Trace = max hold

Time of Occupancy (Dwell Time):

The hopping function of the EUT is enabled. Use the spectrum analyzer setting as follows:

- Span = 0 Hz centered on a hopping channel
- RBW = 1 MHz
- VBW ≥ RBW
- Sweep = as necessary to capture the entire dwell time per hopping channel
- Detector = peak
- Trace = max hold

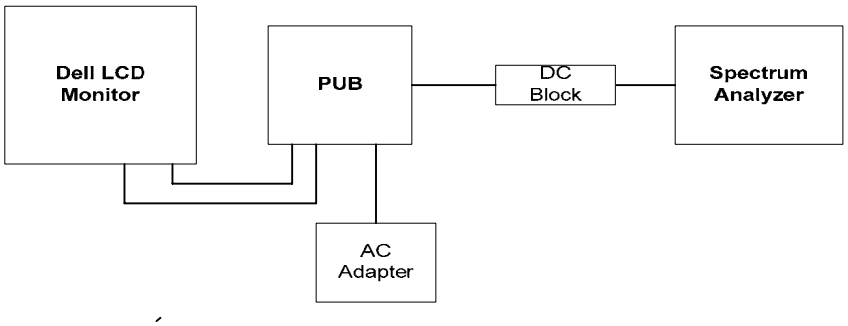
If possible, use the marker-delta function to determine the dwell time. If this value varies with different modes of operation (e.g. date rate modulation format, etc.), repeat this test for each variation. The limit is specified in one of the subparagraphs of this Section. Submit this plot(s). An oscilloscope may be used instead of a spectrum analyzer.

20 dB Bandwidth:

Use the spectrum analyzer setting as follows:

- Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel
- RBW = 1% of the 20 dB bandwidth
- VBW ≥ RBW
- Sweep = auto
- Detector = peak
- Trace = max hold
- The transmitter shall be transmitting at its maximum data rate.
- Allow the trace to stabilize.
- Use the marker-to-peak function to set the marker to the peak of the emission.
- Use the marker-delta function to measure 20 dB down on both sides of the emission.
- The 20 dB BW is the delta reading in frequency between two markers.

5.8.3. Test Arrangement

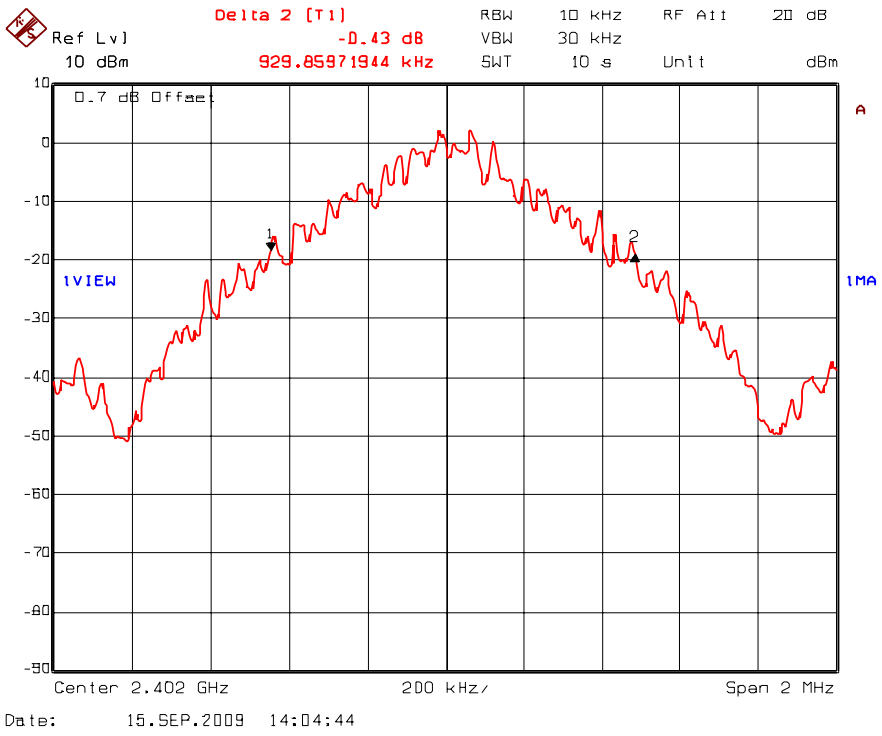


5.8.4. Test Data

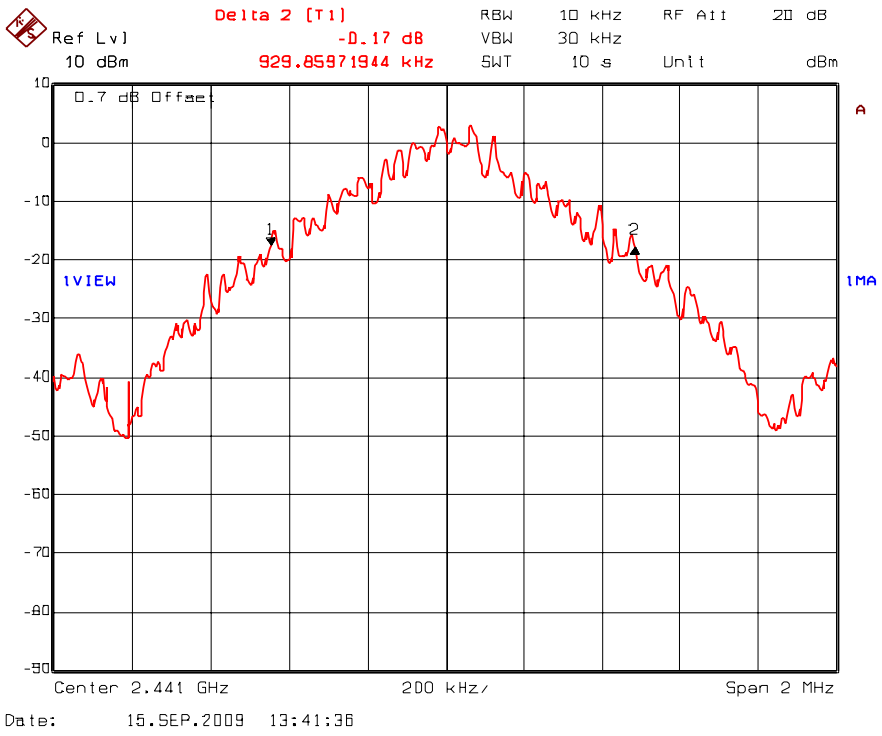
Test Description	FCC Specification	Measured Values
20 dB bandwidth		929.9 KHz for GFSK 1.3908 MHz for π/4 DPQSK 1.3868 MHz for 8DPSK
Channel Hopping Frequency Separation	Minimum of 25 kHz or two-third of 20dB BW, whichever is greater.	1.010 MHz for all modes
Number of hopping frequencies	5 MHz band shall use at least 15 channels	79 hopping frequencies for all modes
Average Time of Occupancy	The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.	24.97 ms for GFSK 24.97 ms for π/4 DPQSK 22.61 ms for 8DPSK

Remark: See the following plots for details.

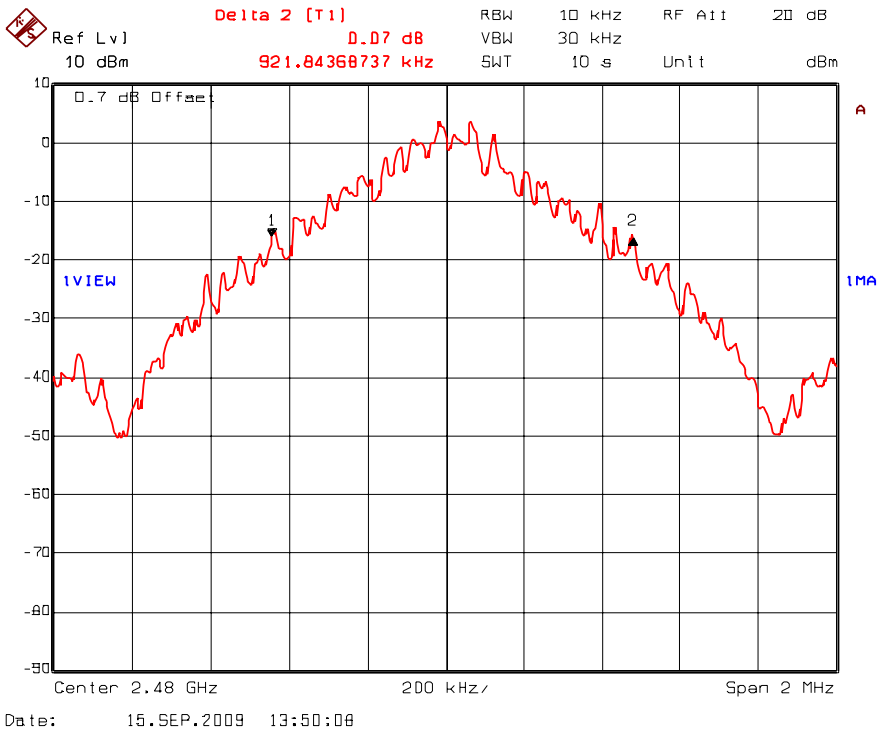
Plot 5.8.4.1. 20 dB Bandwidth
Test Frequency: 2402 MHz. GFSK Modulation



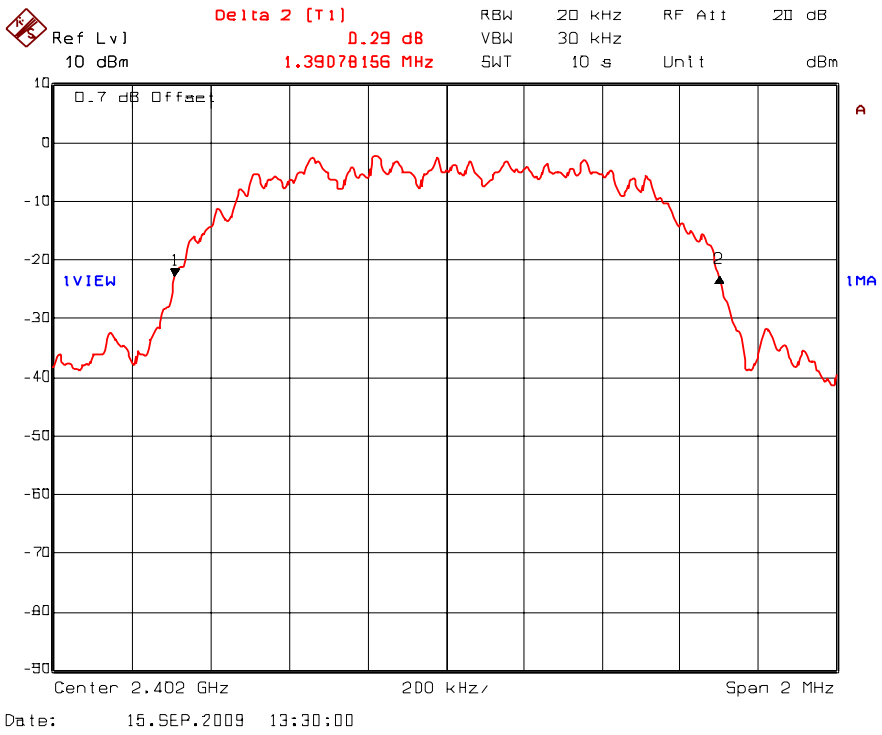
Plot 5.8.4.2. 20 dB Bandwidth
Test Frequency: 2441 MHz. GFSK Modulation



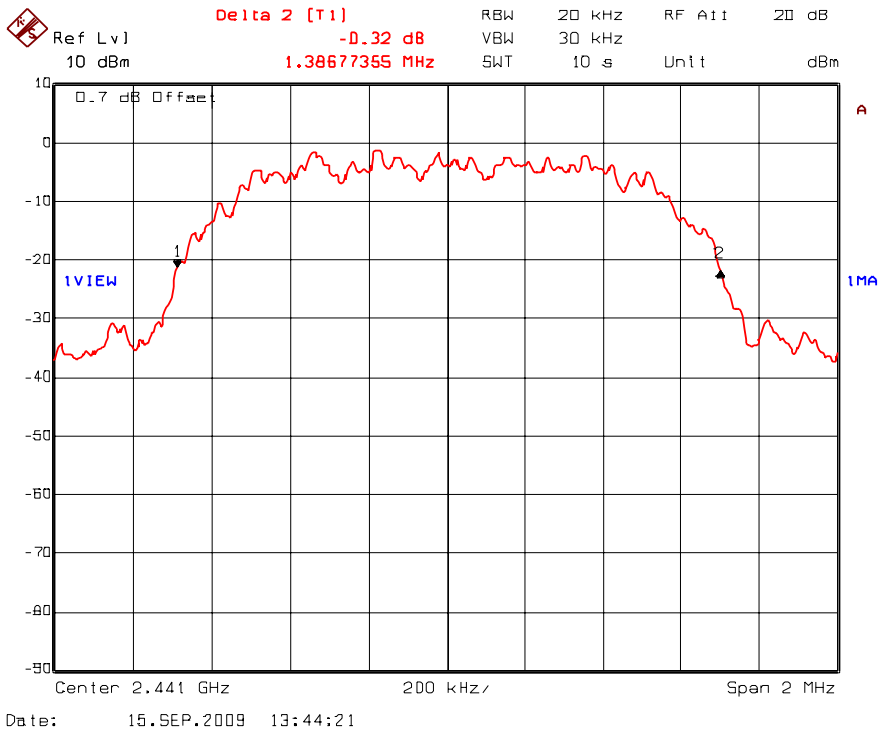
Plot 5.8.4.3. 20 dB Bandwidth
Test Frequency: 2480 MHz. GFSK Modulation



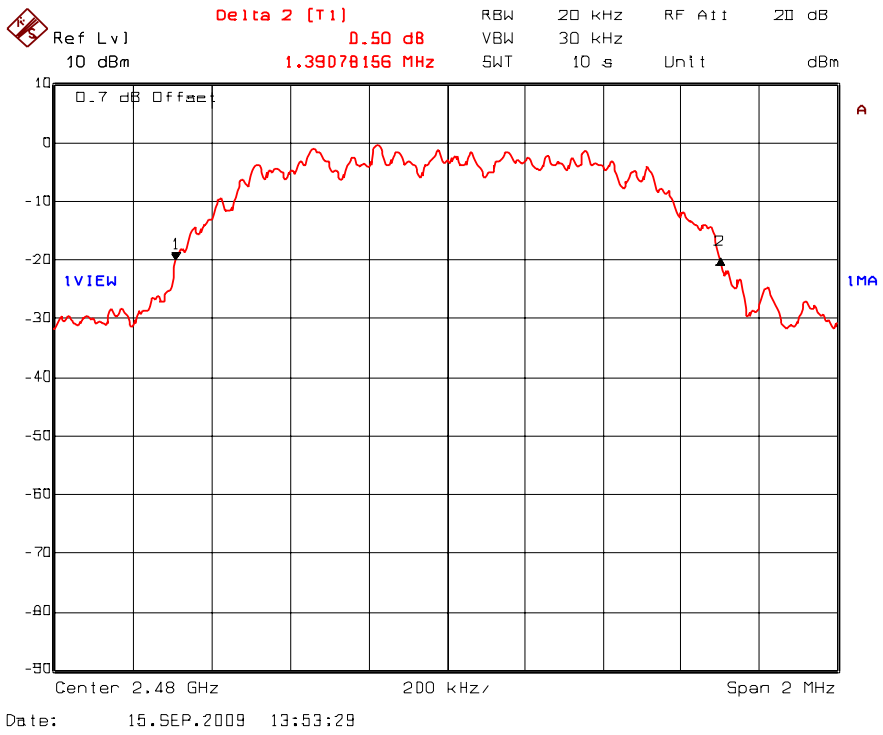
Plot 5.8.4.4. 20 dB Bandwidth
Test Frequency: 2402 MHz. π/4 DPQSK Modulation



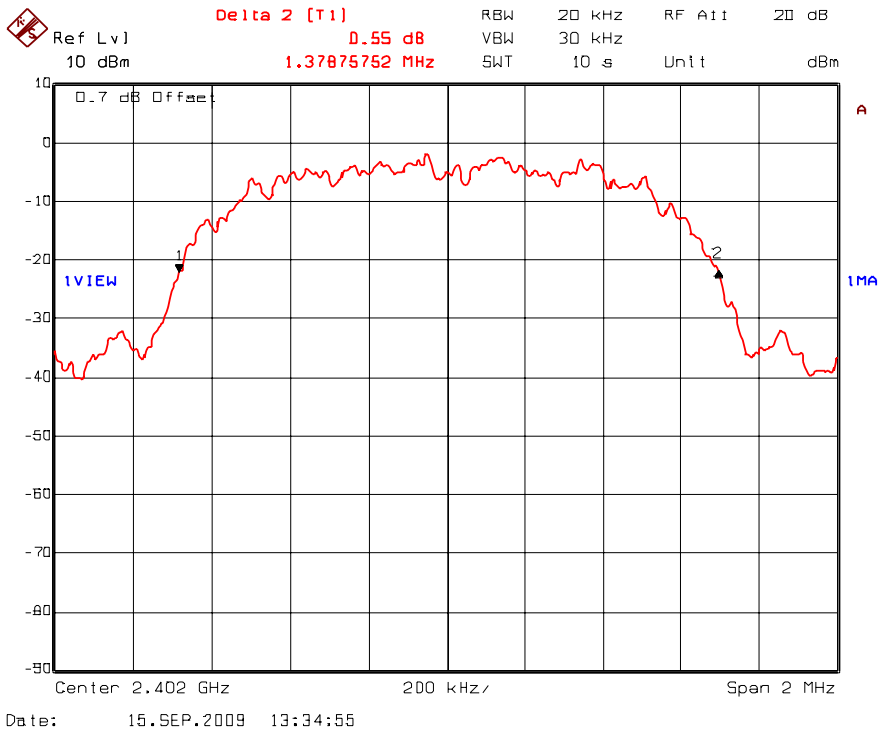
Plot 5.8.4.5. 20 dB Bandwidth
Test Frequency: 2441 MHz. π/4 DPQSK Modulation



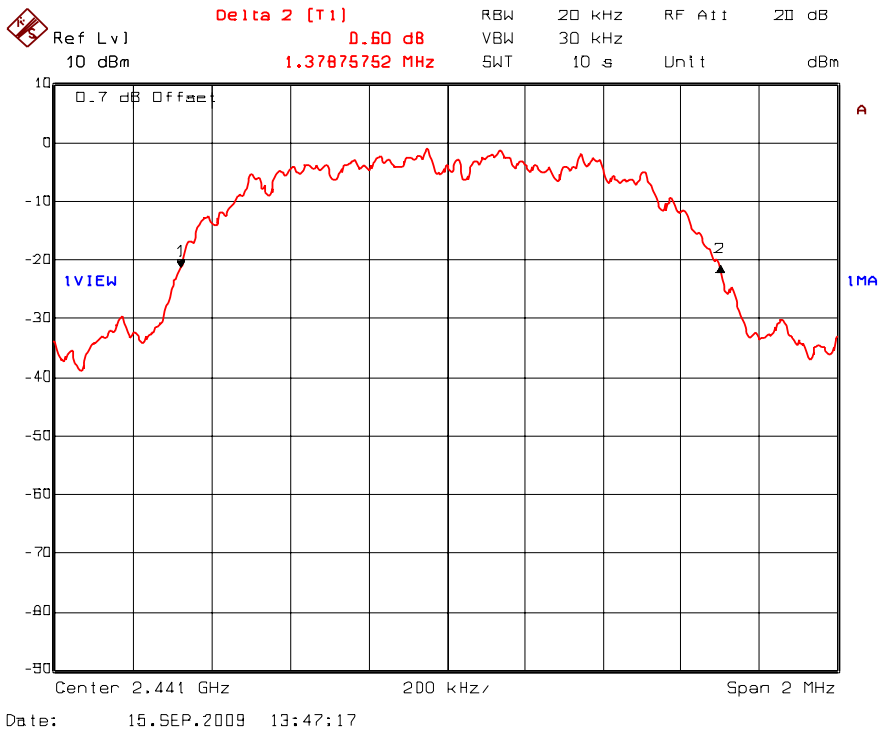
Plot 5.8.4.6. 20 dB Bandwidth
Test Frequency: 2480 MHz. π/4 DPQSK Modulation



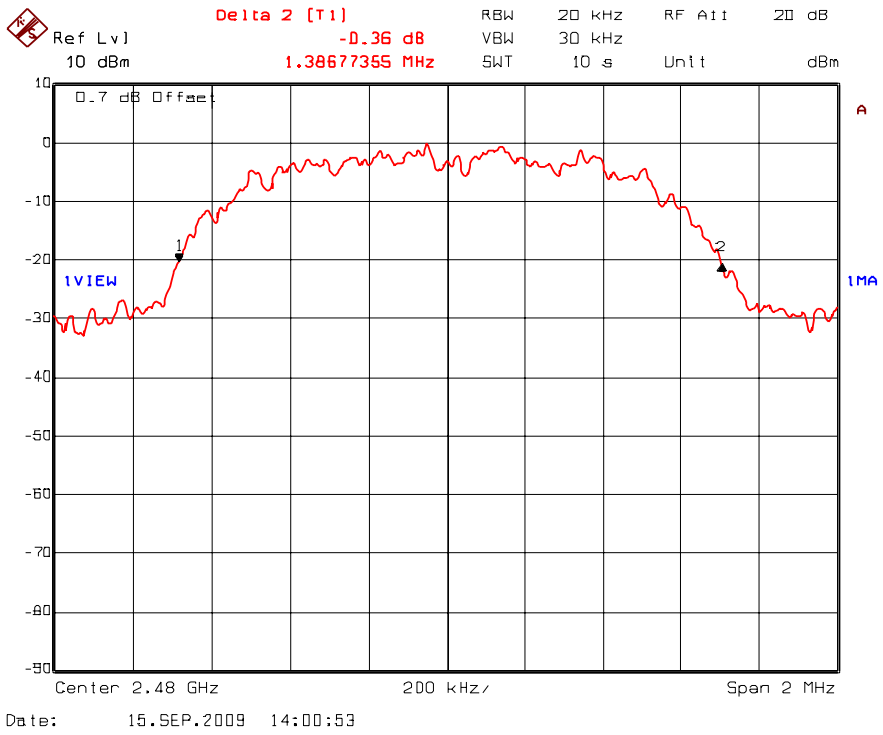
Plot 5.8.4.7. 20 dB Bandwidth
Test Frequency: 2402 MHz. 8DPSK Modulation



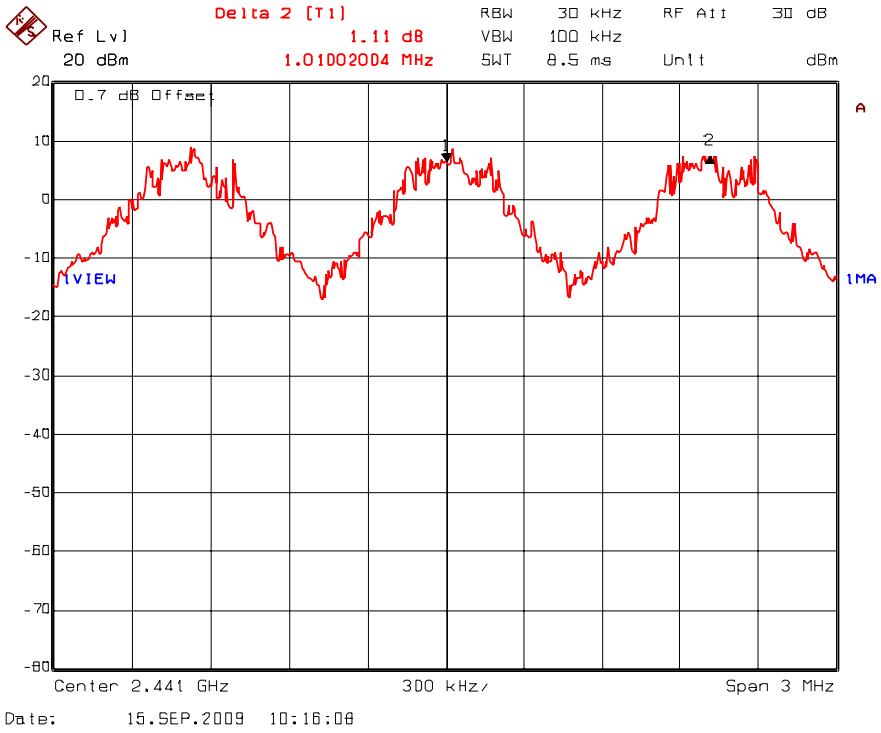
Plot 5.8.4.8. 20 dB Bandwidth
Test Frequency: 2441 MHz. 8DPSK Modulation



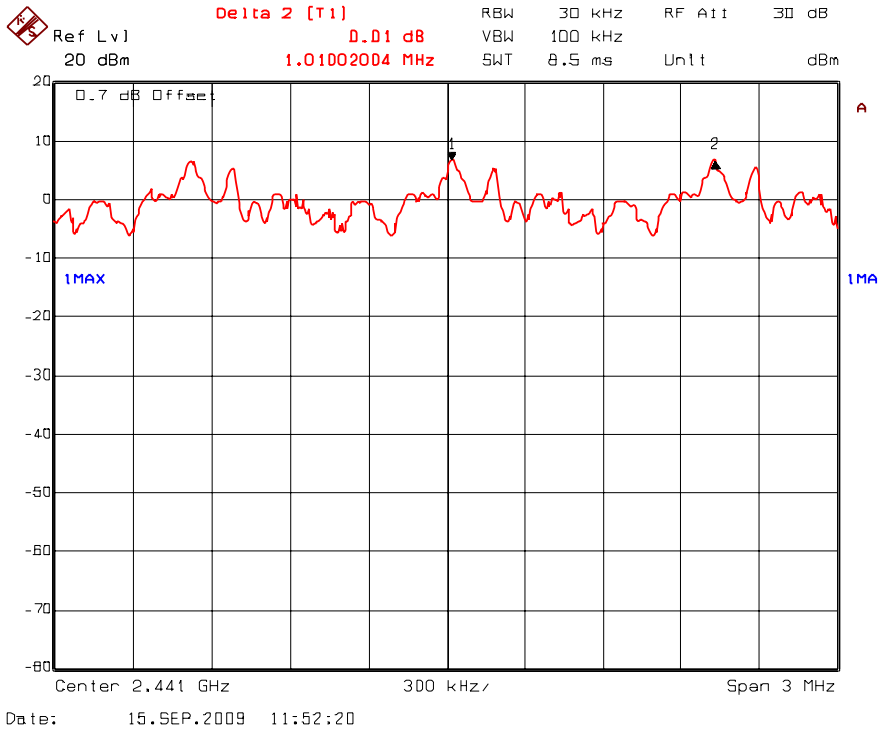
Plot 5.8.4.9. 20 dB Bandwidth
Test Frequency: 2480 MHz. 8DPSK Modulation



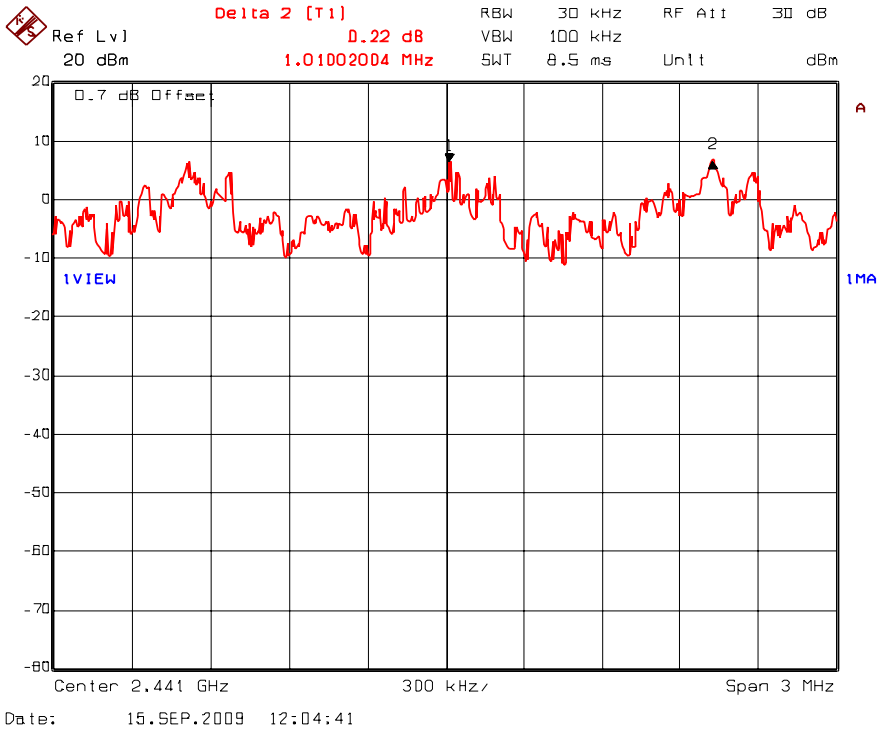
Plot 5.8.4.10. Carrier Frequency Separation
GFSK Modulation



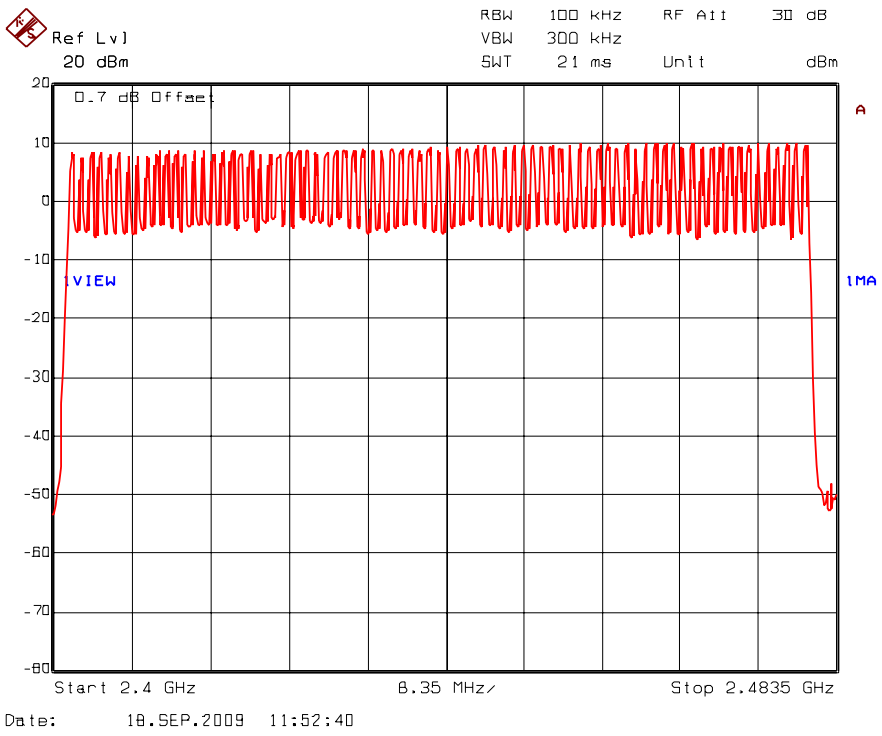
Plot 5.8.4.11. Carrier Frequency Separation
π/4 DPQSK Modulation



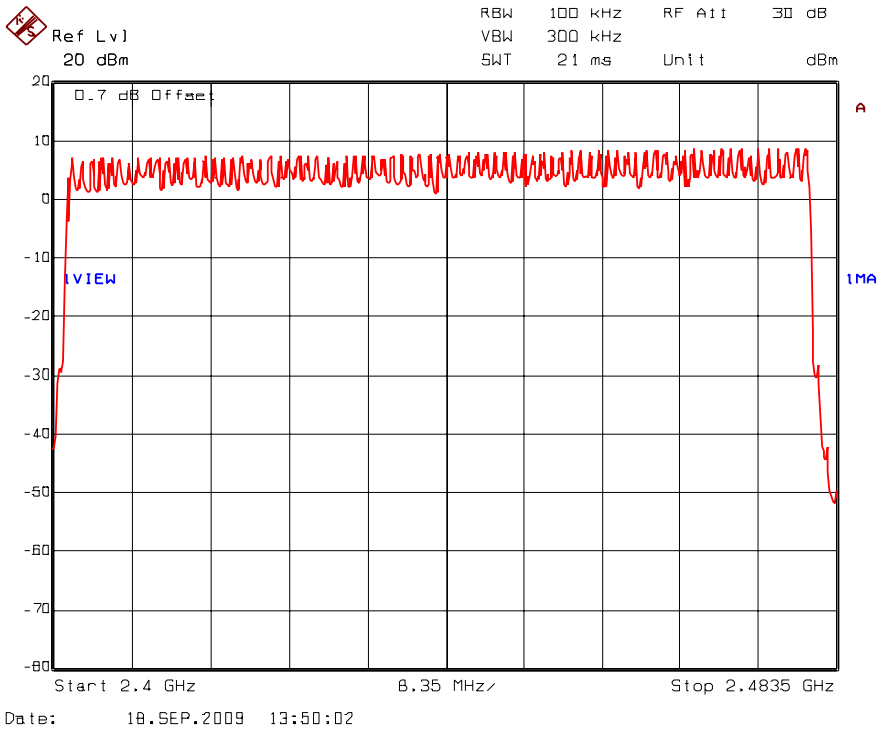
Plot 5.8.4.12. Carrier Frequency Separation
8DPSK Modulation



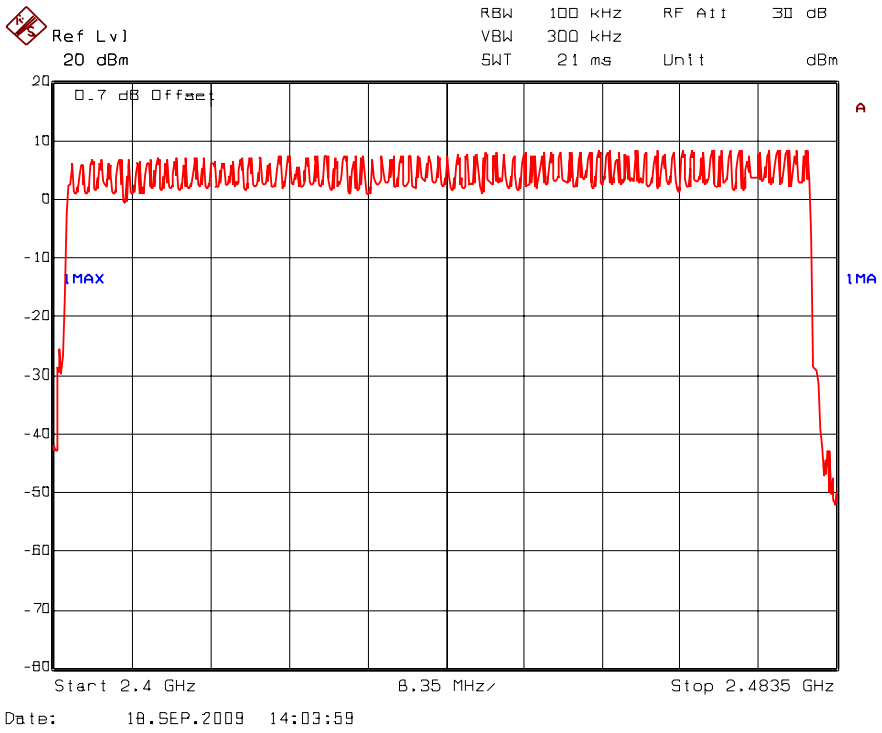
Plot 5.8.4.13. Number of Hopping Frequencies
79 hopping channels, GFSK Modulation



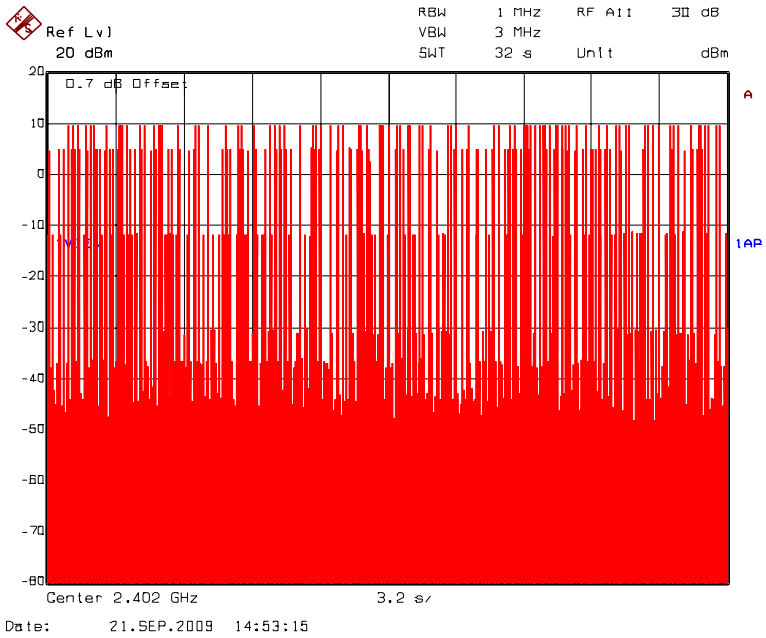
Plot 5.8.4.14. Number of Hopping Frequencies
79 hopping channels, π/4 DPQSK Modulation

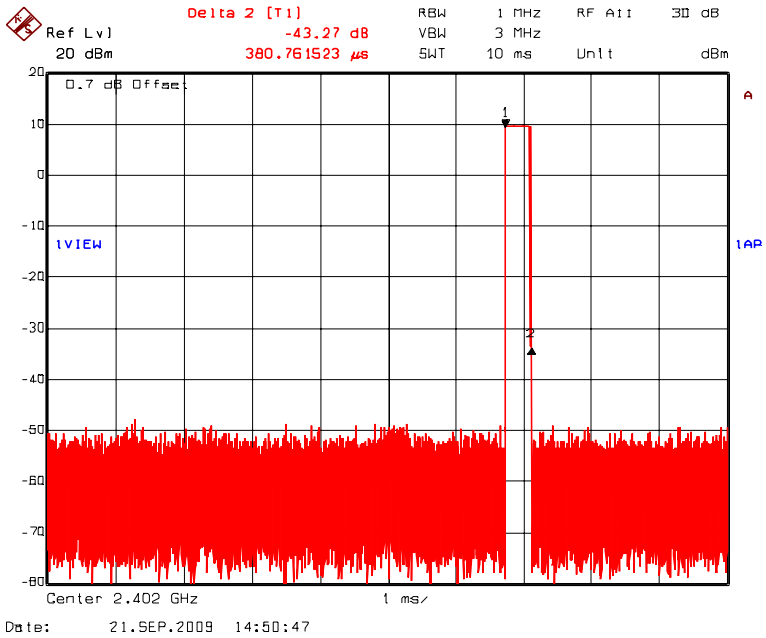


Plot 5.8.4.15. Number of Hopping Frequencies
79 hopping channels, 8DPSK Modulation

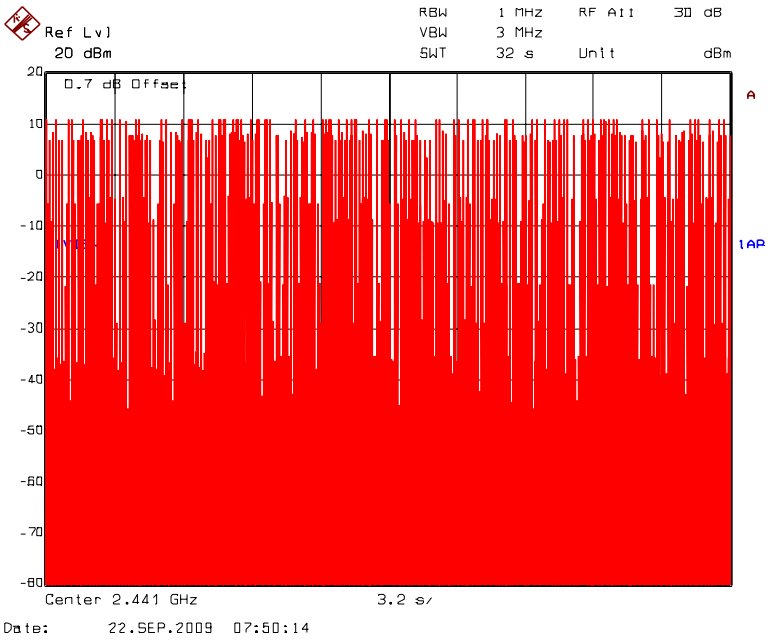


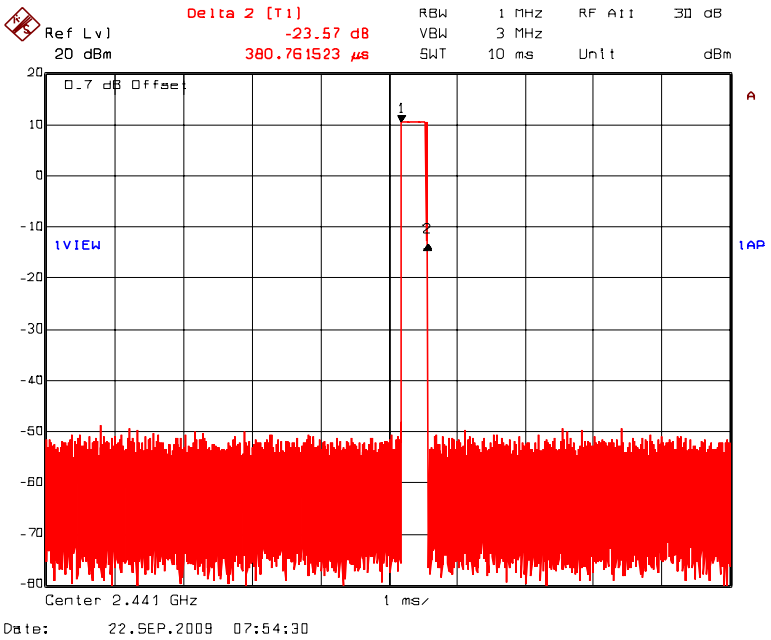
Plot 5.8.4.16. Time of Occupancy
Test Frequency: 2402 MHz, GFSK modulation
77 * 380.76µs= 29318.52 µs = 29.32ms < 400ms in 32s



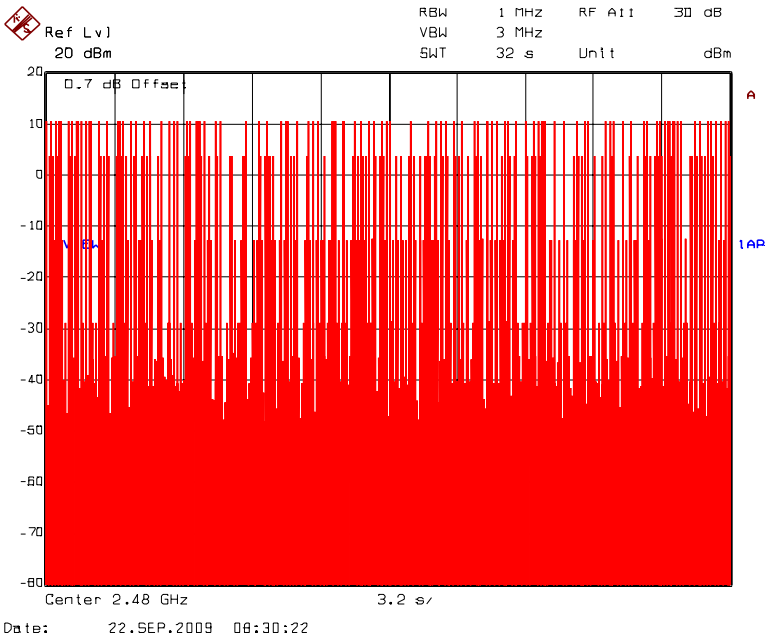


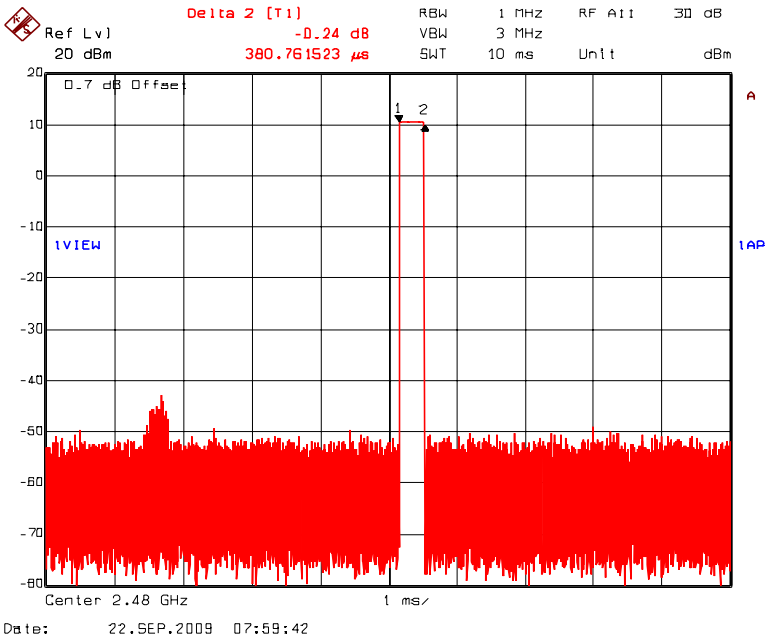
Plot 5.8.4.17. Time of Occupancy
Test Frequency: 2441 MHz, GFSK modulation
78 * 380.76µs= 29699.28 µs = 29.70ms < 400ms in 32s



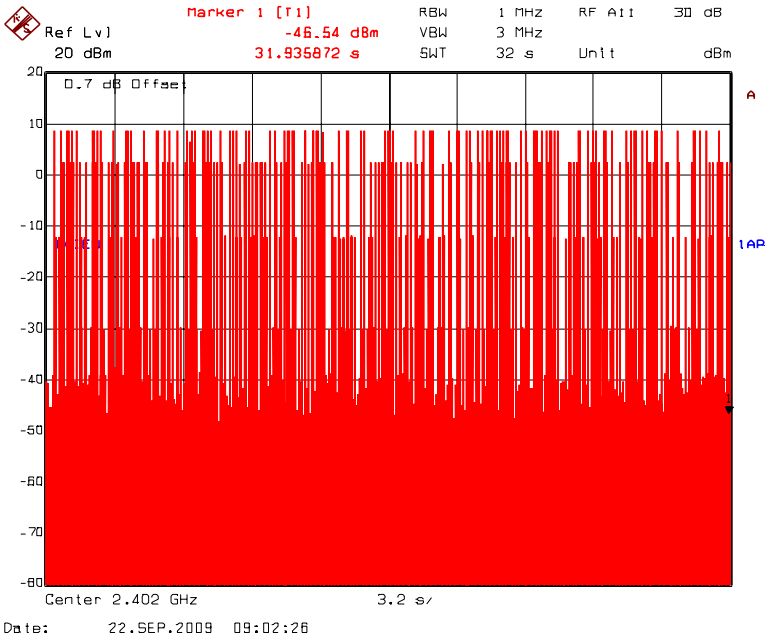


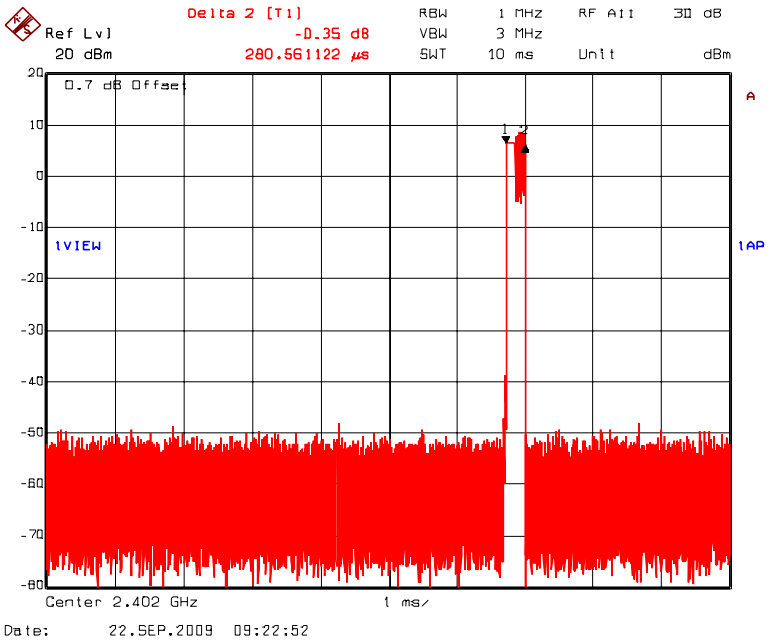
Plot 5.8.4.18. Time of Occupancy
Test Frequency: 2480 MHz, GFSK modulation
96 * 380.76µs= 36552.96 µs = 36.55ms < 400ms in 32s



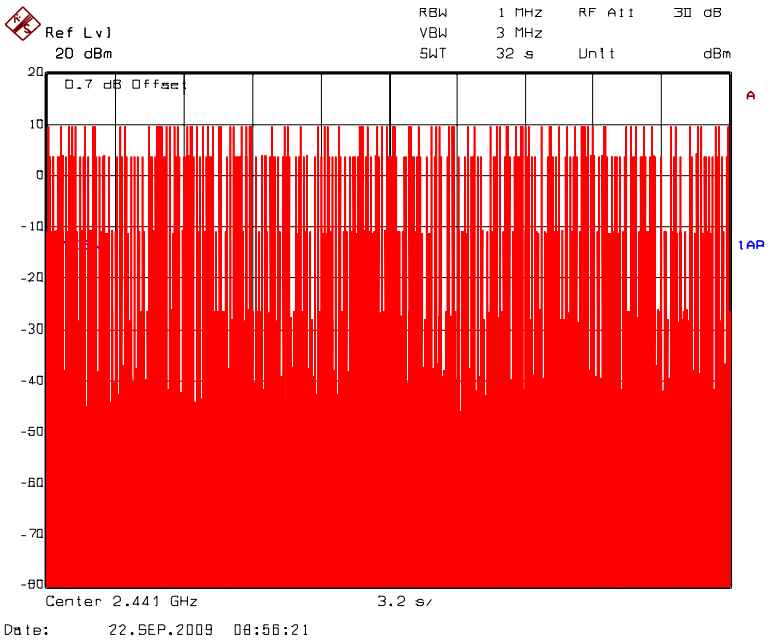


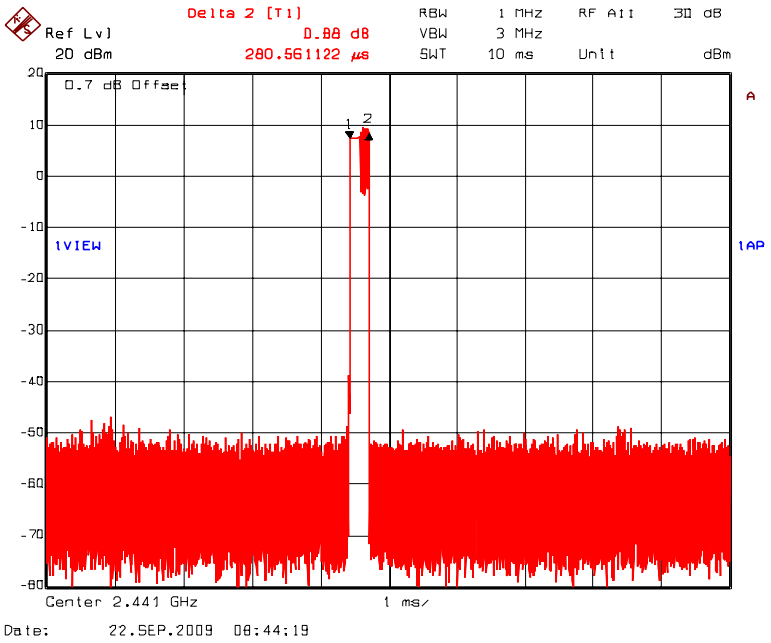
Plot 5.8.4.19. Time of Occupancy
Test Frequency: 2402 MHz, π/4 DPQSK modulation
86 * 280.56µs= 24128.16 µs = 24.13ms < 400ms in 32s



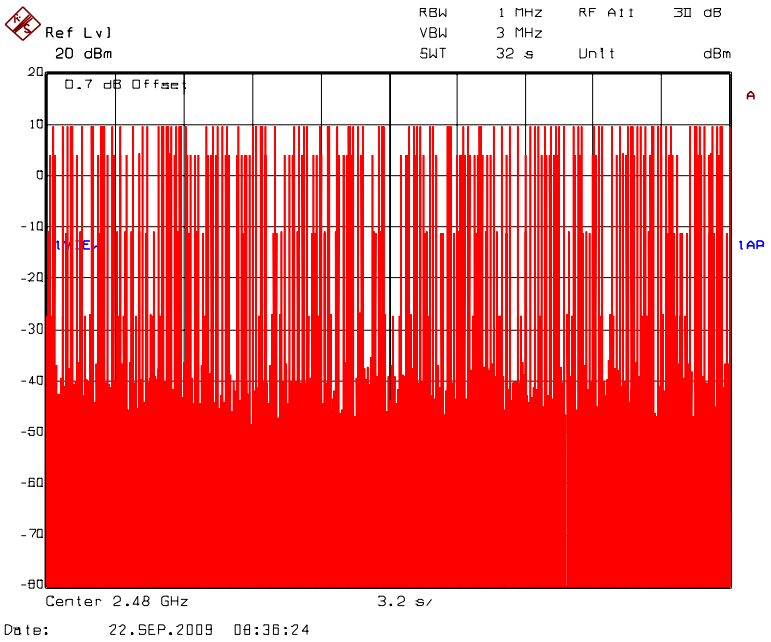


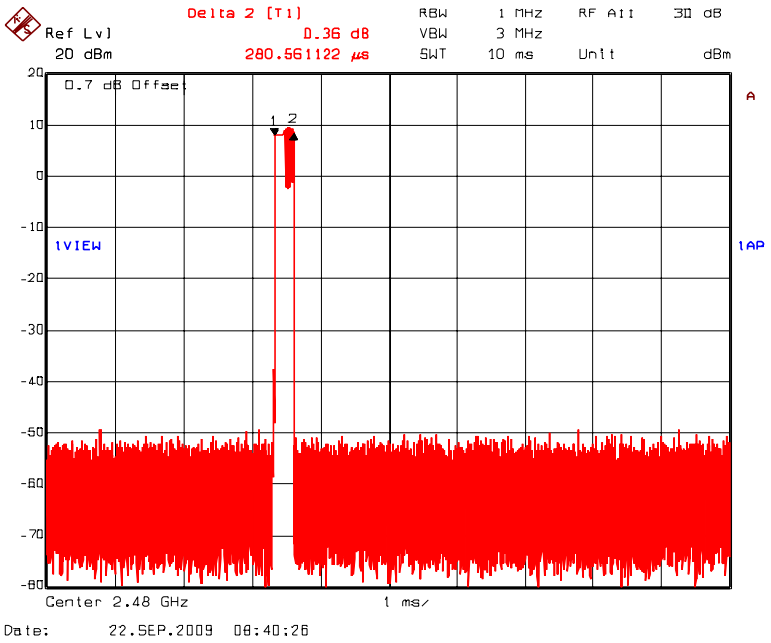
Plot 5.8.4.20. Time of Occupancy
Test Frequency: 2441 MHz, π/4 DPQSK modulation
81 * 280.56µs= 22725.36 µs = 22.73ms < 400ms in 32s



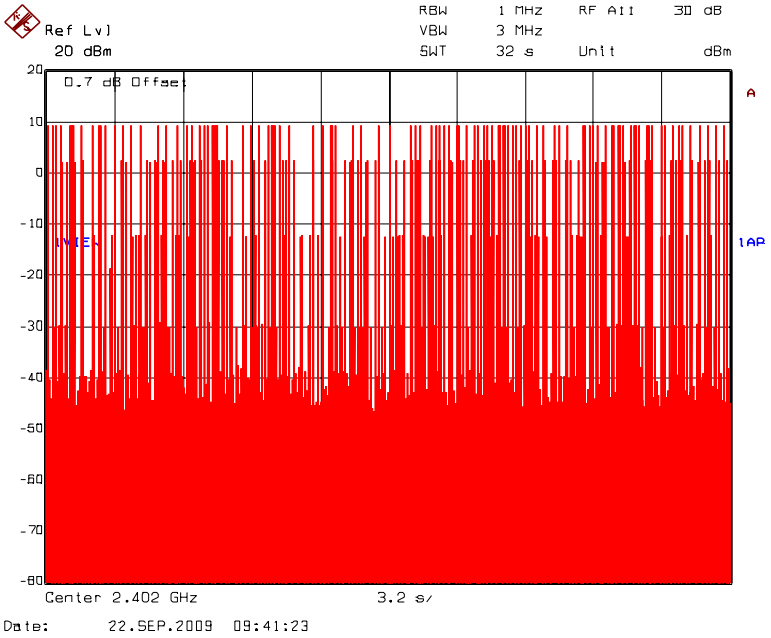


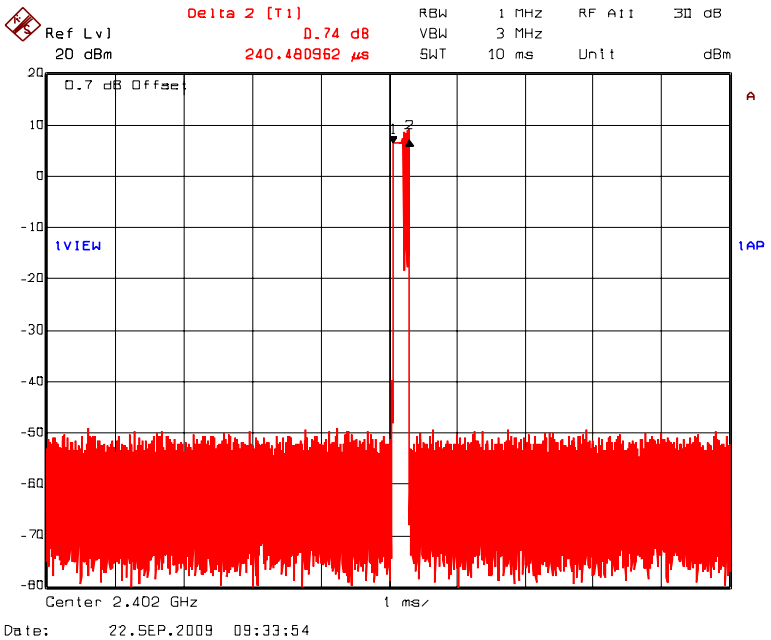
Plot 5.8.4.21. Time of Occupancy
Test Frequency: 2480 MHz, π/4 DPQSK modulation
89 * 280.56µs= 24969.84 µs = 24.97ms < 400ms in 32s



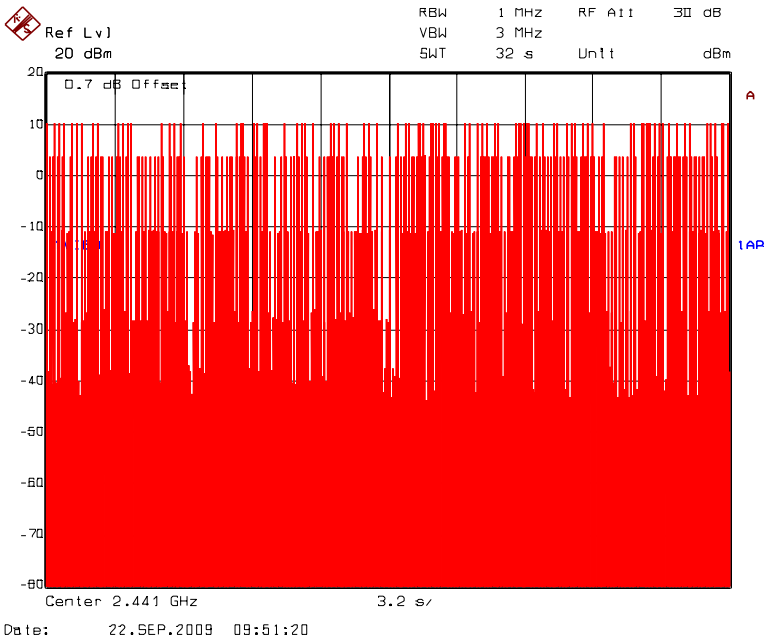


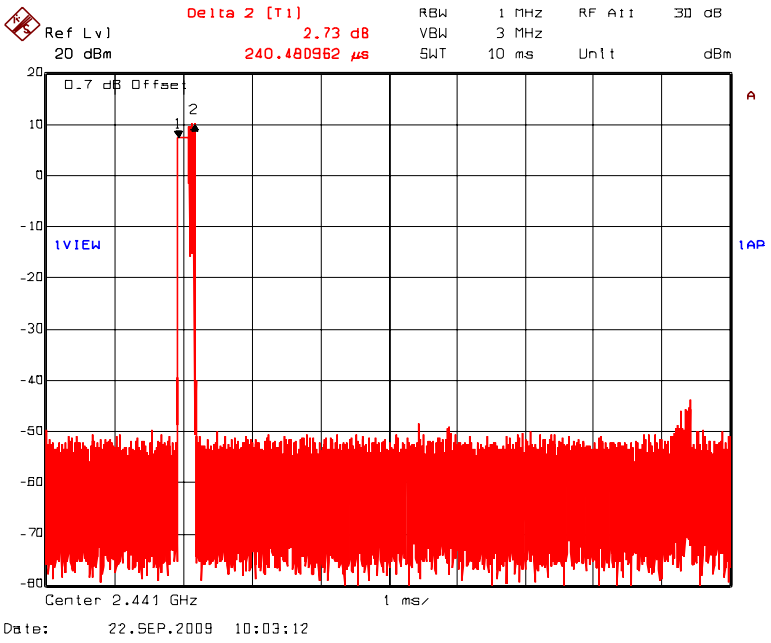
Plot 5.8.4.22. Time of Occupancy
Test Frequency: 2402 MHz, 8DPSK modulation
94 * 240.48µs= 22605.12 µs = 22.61ms < 400ms in 32s



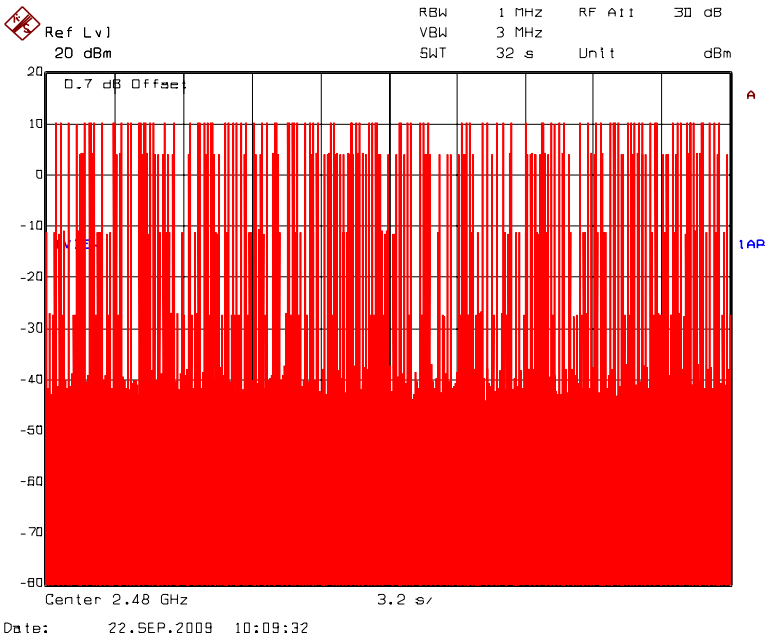


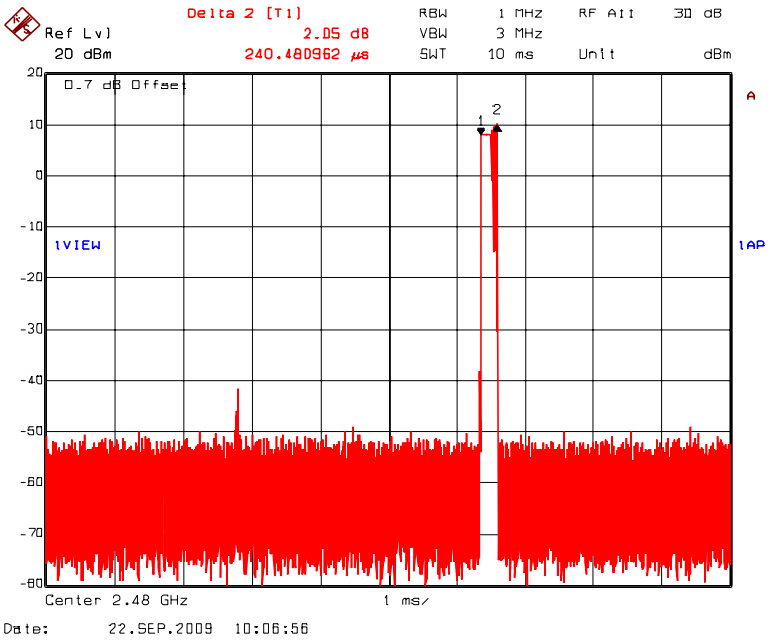
Plot 5.8.4.23. Time of Occupancy
Test Frequency: 2441 MHz, 8DPSK modulation
85 * 240.48µs= 20440.80 µs = 20.44ms < 400ms in 32s





Plot 5.8.4.24. Time of Occupancy
Test Frequency: 2480 MHz, 8DPSK modulation
93 * 240.48µs= 22364.64 µs = 22.36ms < 400ms in 32s





5.9. 6 dB BANDWIDTH [§ 15.247(a)(2)]

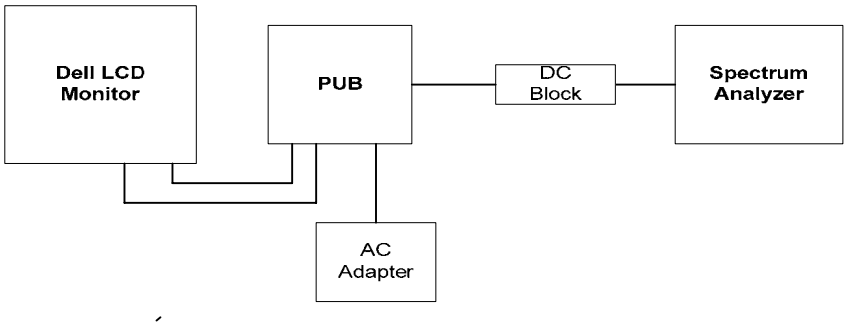
5.9.1. Limit

§15.247(a)(2) Systems using digital modulation techniques may operate in the 902-928 MHz, 2402-2480 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

5.9.2. Method of Measurements

FCC Public Notice DA 00-705 and ANSI C63.4.

5.9.3. Test Arrangement

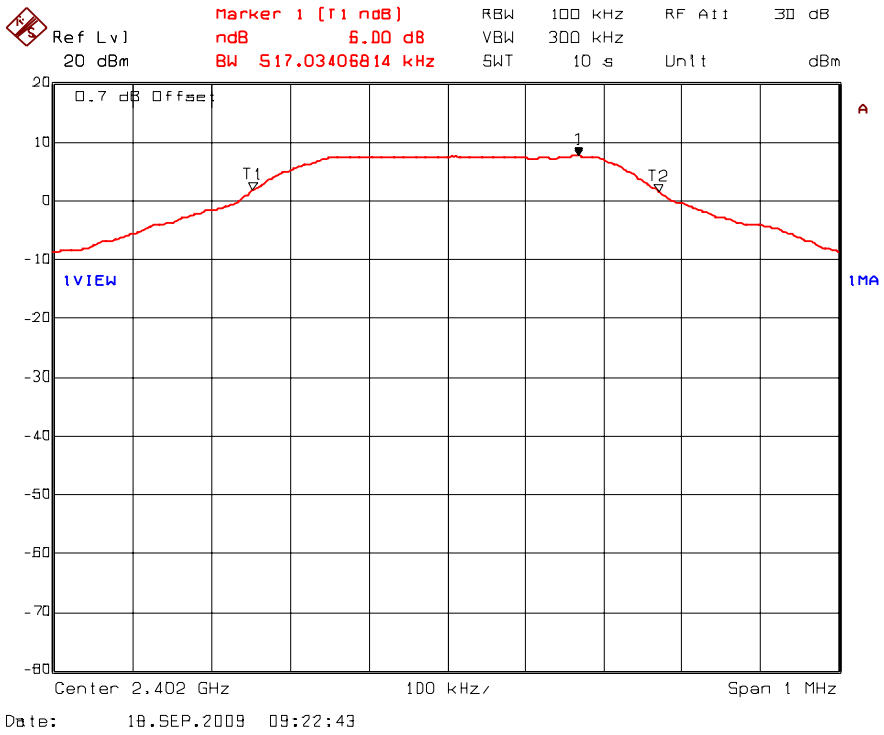


5.9.4. Test Data

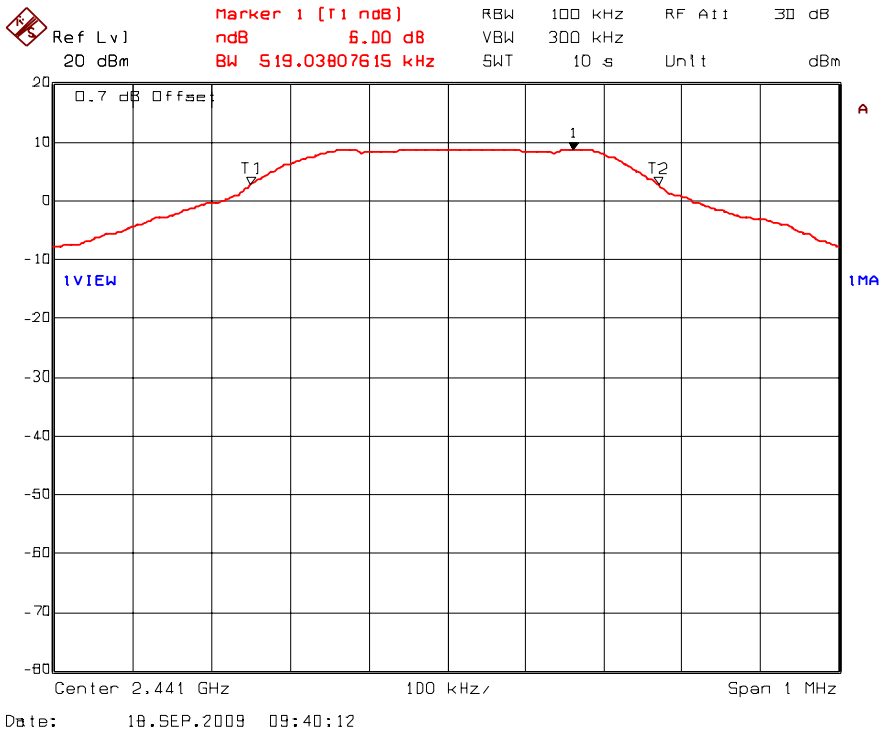
Transmitter Channel	Frequency (MHz)	6 dB Bandwidth (kHz)
GFSK Modulation		
Lowest	2402	517.034
Middle	2441	519.038
Highest	2480	513.026
π/4 DPQSK Modulation		
Lowest	2402	1082.164
Middle	2441	1082.164
Highest	2480	1078.156
8DPSK Modulation		
Lowest	2402	1094.188
Middle	2441	1098.196
Highest	2480	1090.180

Remark: See the following plots for details.

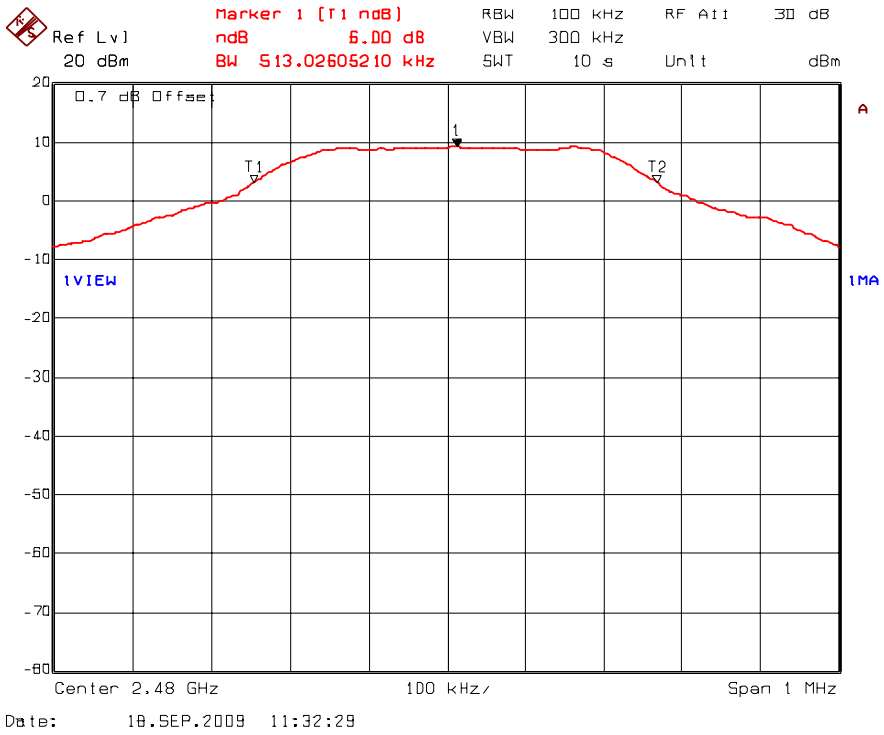
Plot 5.9.4.1. 6 dB Bandwidth
Test Frequency: 2402 MHz, GFSK Modulation



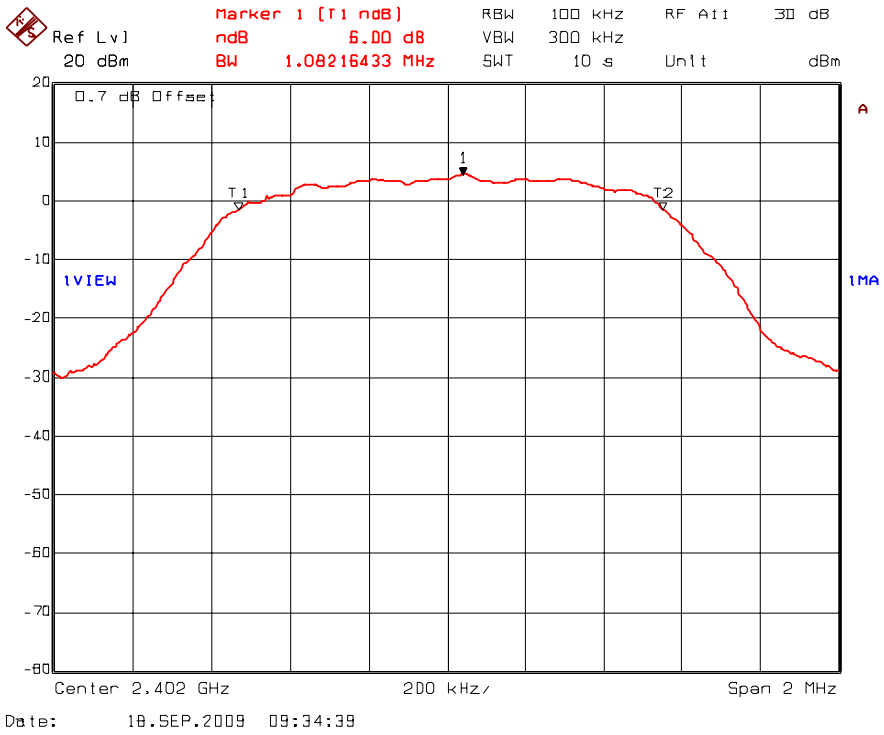
Plot 5.9.4.2. 6 dB Bandwidth
Test Frequency: 2441 MHz, GFSK Modulation



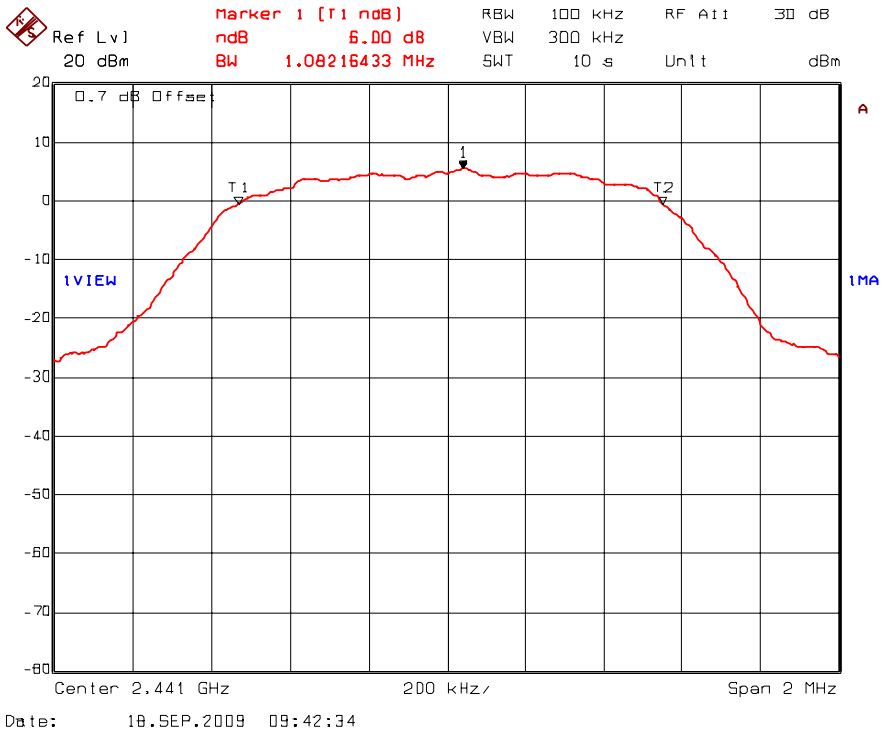
Plot 5.9.4.3. 6 dB Bandwidth
Test Frequency: 2480 MHz, GFSK Modulation



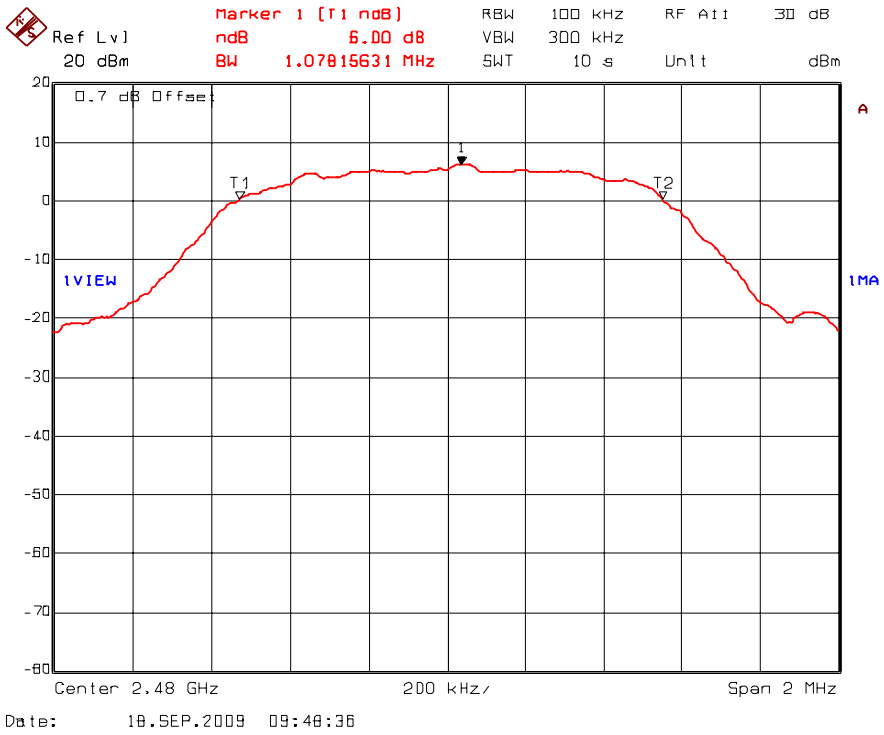
Plot 5.9.4.4. 6 dB Bandwidth
Test Frequency: 2402 MHz, π/4 DPQSK modulation



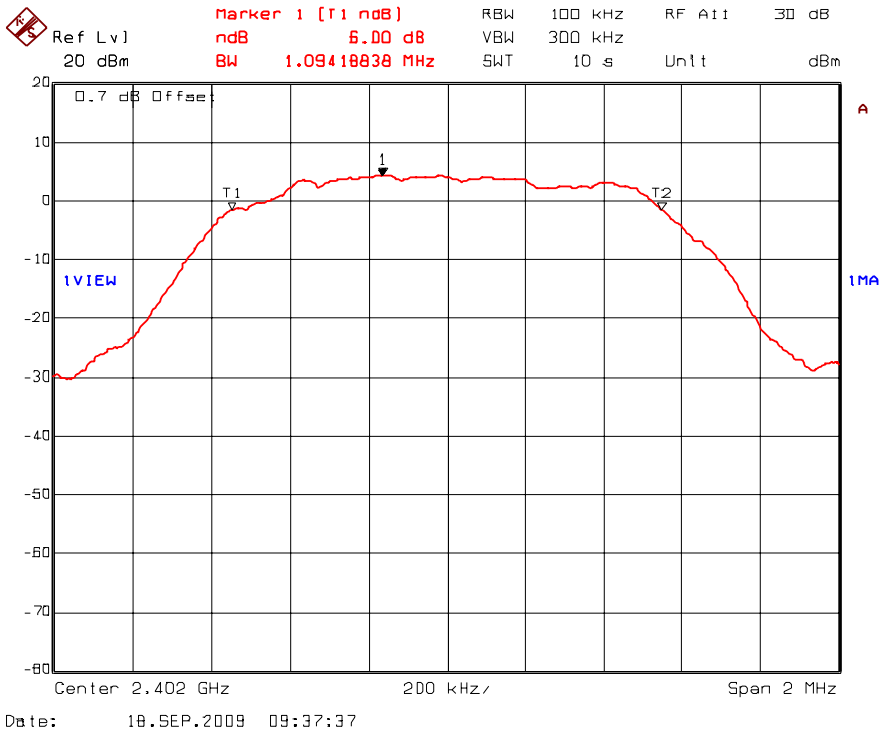
Plot 5.9.4.5. 6 dB Bandwidth
Test Frequency: 2441 MHz, π/4 DPQSK modulation



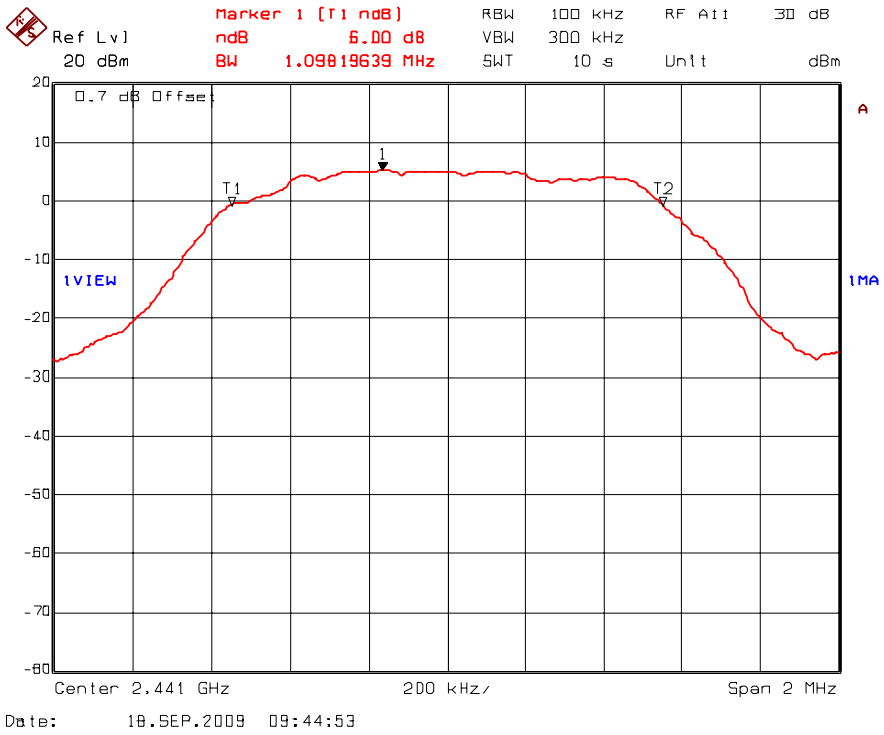
Plot 5.9.4.6. 6 dB Bandwidth
Test Frequency: 2480 MHz, π/4 DPQSK modulation



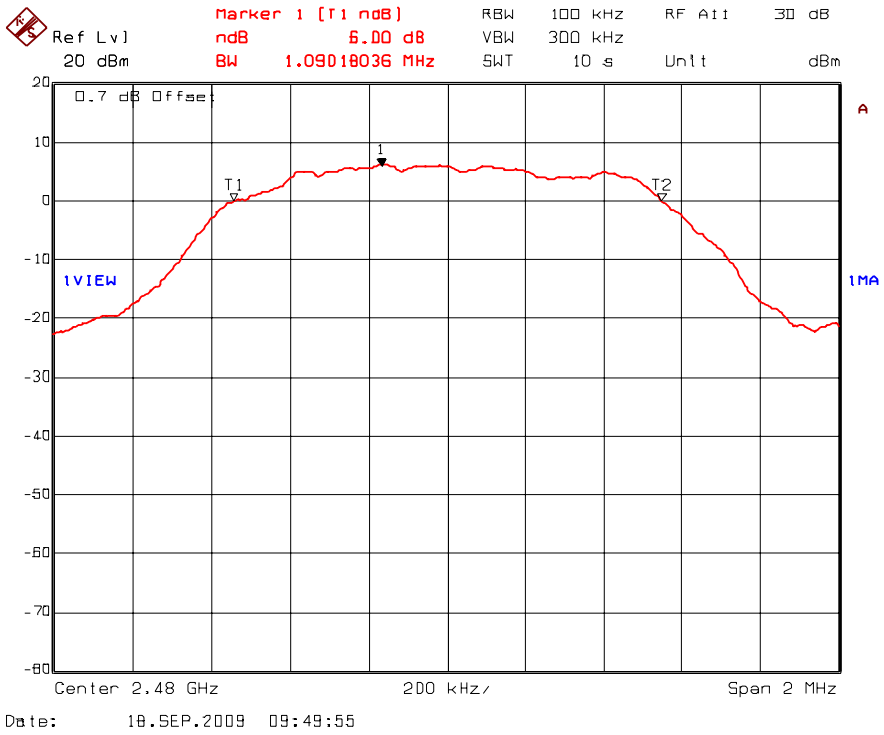
Plot 5.9.4.7. 6 dB Bandwidth
Test Frequency: 2402 MHz, 8DPSK modulation



Plot 5.9.4.8. 6 dB Bandwidth
Test Frequency: 2441 MHz, 8DPSK modulation



Plot 5.9.4.9. 6 dB Bandwidth
Test Frequency: 2480 MHz, 8DPSK modulation



5.10. PEAK OUTPUT POWER & EQUIVALENT ISOTROPIC RADIATED POWER (EIRP) [§ 15.247(b)(1)]

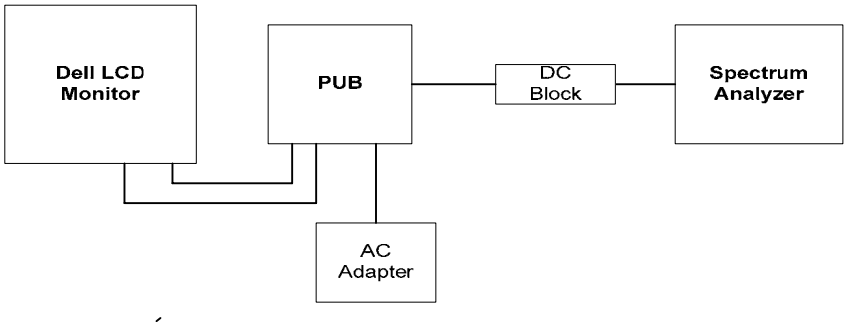
5.10.1. Limit

§15.247(b)(1) For frequency hopping systems operating in the 2402-2480 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2402-2480 MHz band: 0.125 watts.

5.10.2. Method of Measurements

FCC Public Notice DA 00-705 and ANSI C63.4.

5.10.3. Test Arrangement

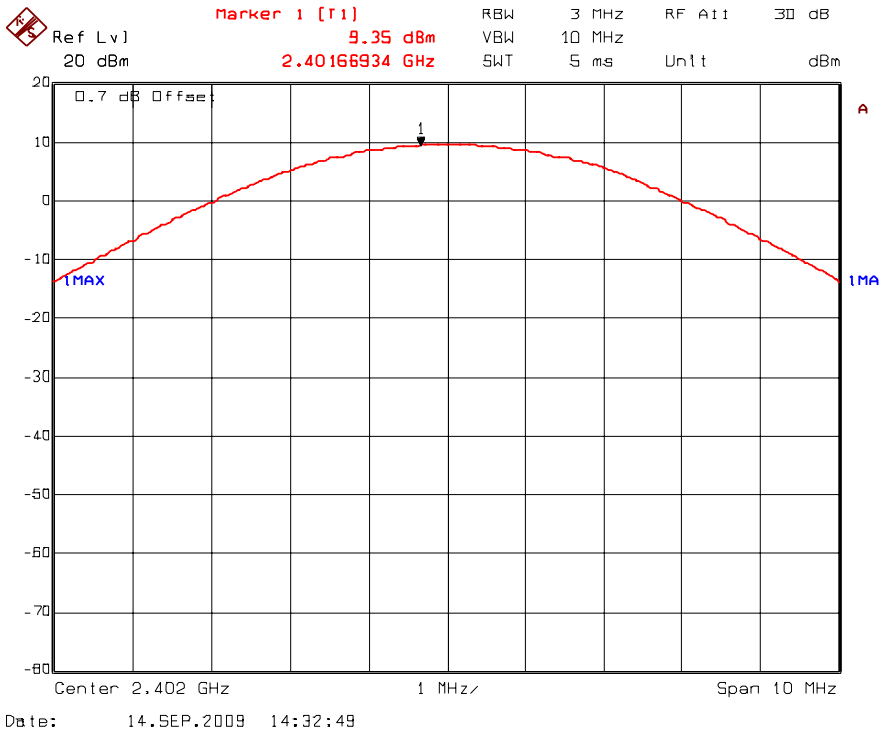


5.10.4. Test Data

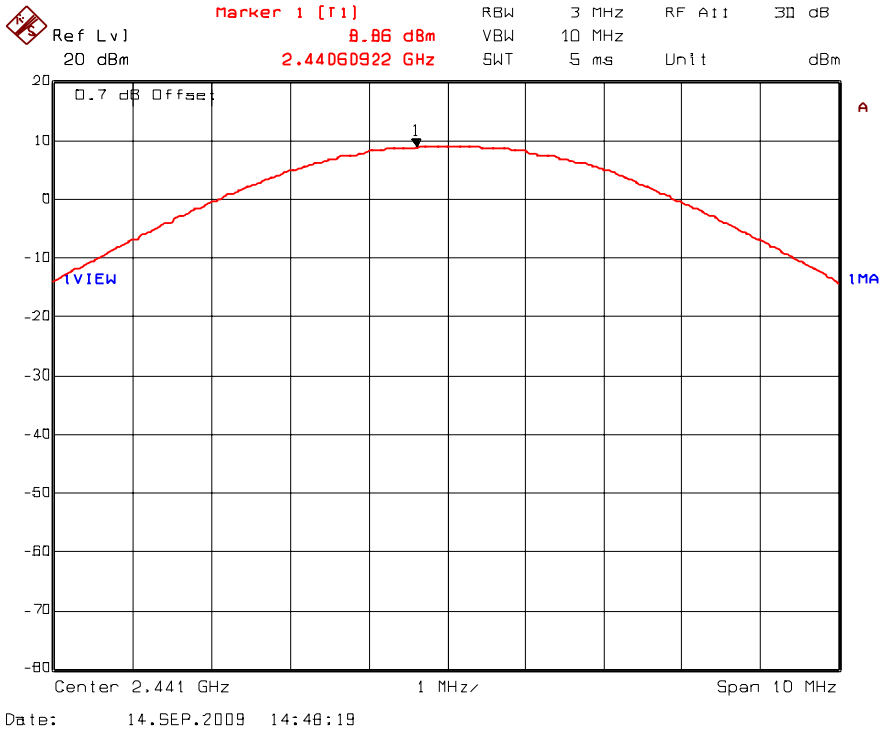
Transmitter Channel	Frequency (MHz)	Peak Output Power at Antenna Terminal (dBm)	Calculated EIRP (dBm)	Peak Output Power Limit (dBm)	EIRP Limit (dBm)
GFSK Modulation					
Lowest	2402	9.36	9.36	30.0	36.0
Middle	2441	8.86	8.86	30.0	36.0
Highest	2480	9.22	9.22	30.0	36.0
π/4 DPQSK Modulation					
Lowest	2402	8.99	8.99	30.0	36.0
Middle	2441	8.49	8.49	30.0	36.0
Highest	2480	8.86	8.86	30.0	36.0
8DPSK Modulation					
Lowest	2402	9.71	9.71	30.0	36.0
Middle	2441	8.99	8.99	30.0	36.0
Highest	2480	9.10	9.10	30.0	36.0

Remark: Antenna gain is 0 dBi
Remark: See the following plots for details.

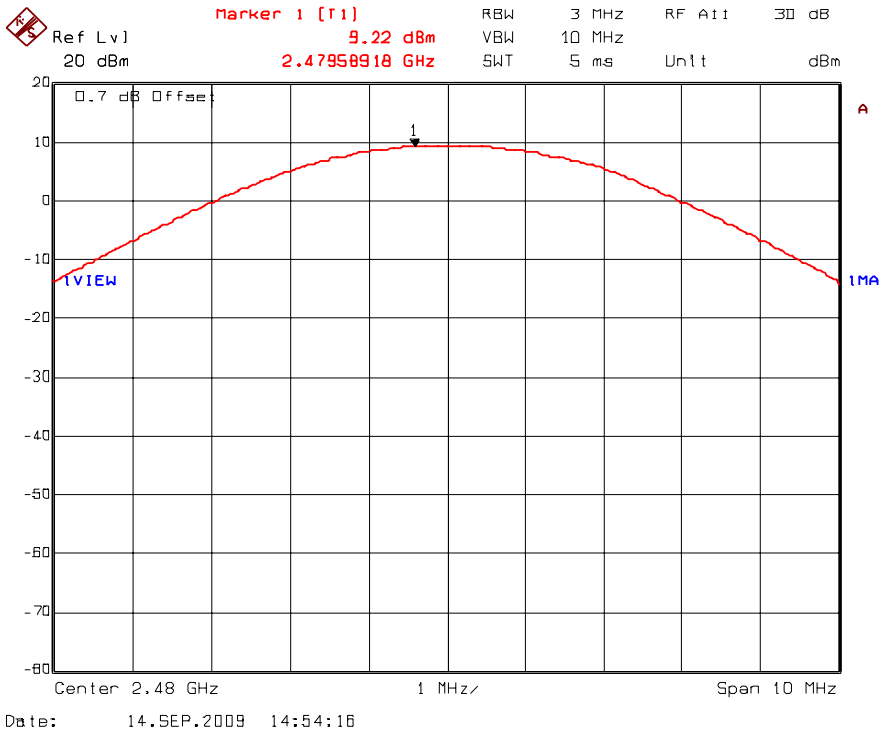
Plot 5.10.4.1. Peak Output Power
Test Frequency: 2402 MHz, GFSK Modulation



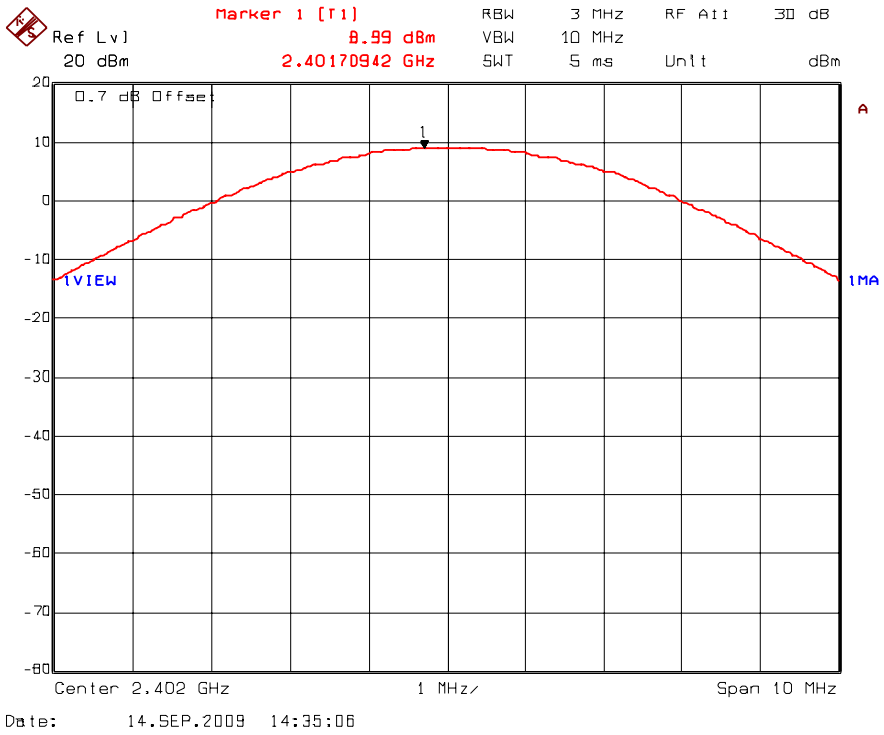
Plot 5.10.4.2. Peak Output Power
Test Frequency: 2441 MHz, GFSK Modulation



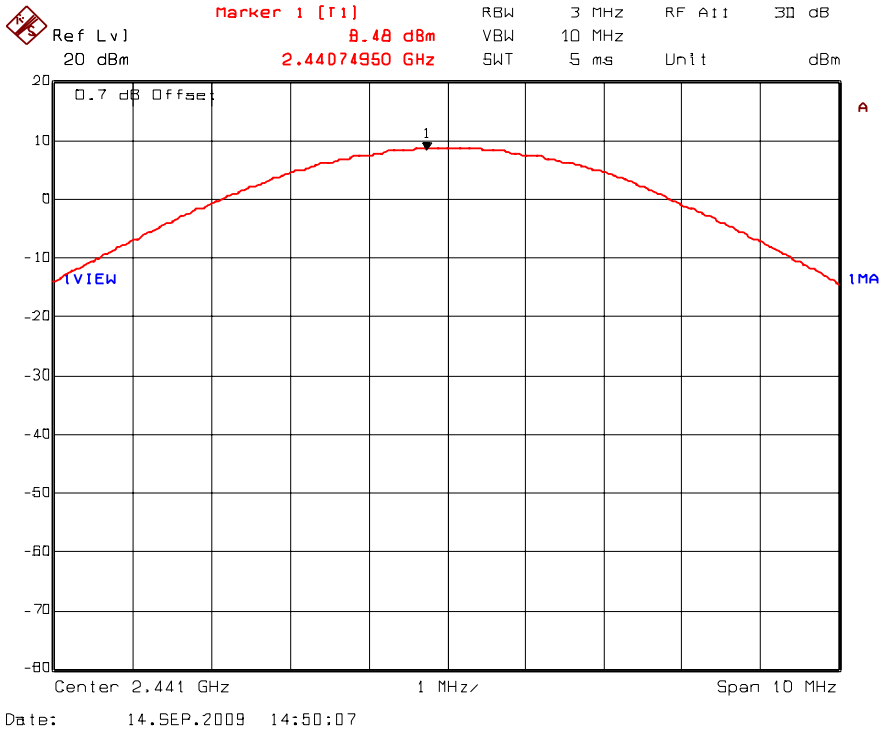
Plot 5.10.4.3. Peak Output Power
Test Frequency: 2480 MHz, GFSK Modulation



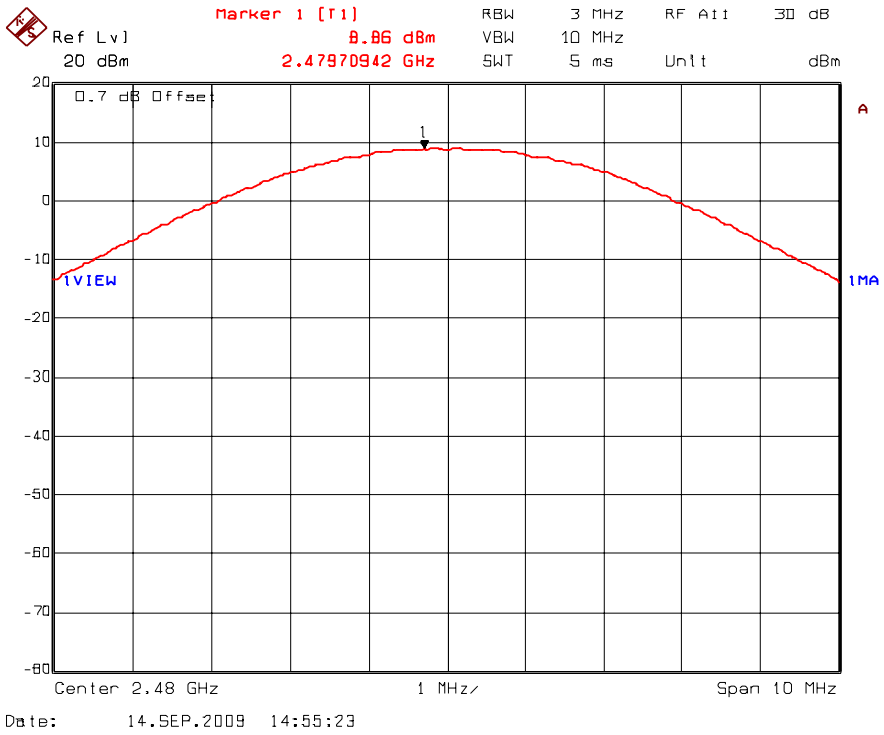
Plot 5.10.4.4. Peak Output Power
Test Frequency: 2402 MHz, π/4 DPQSK modulation



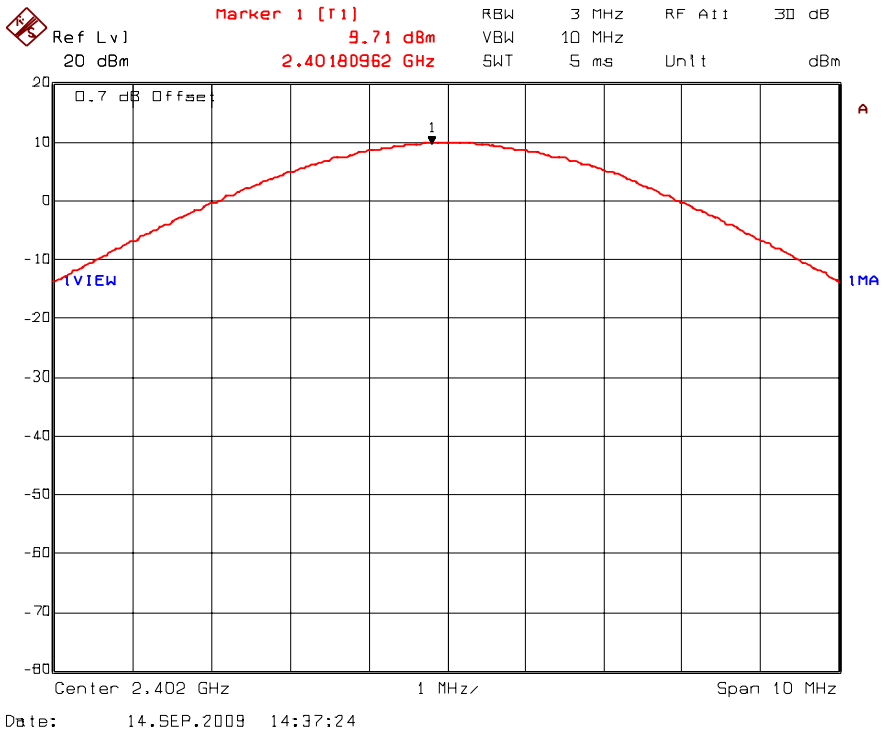
Plot 5.10.4.5. Peak Output Power
Test Frequency: 2441 MHz, π/4 DPQSK modulation



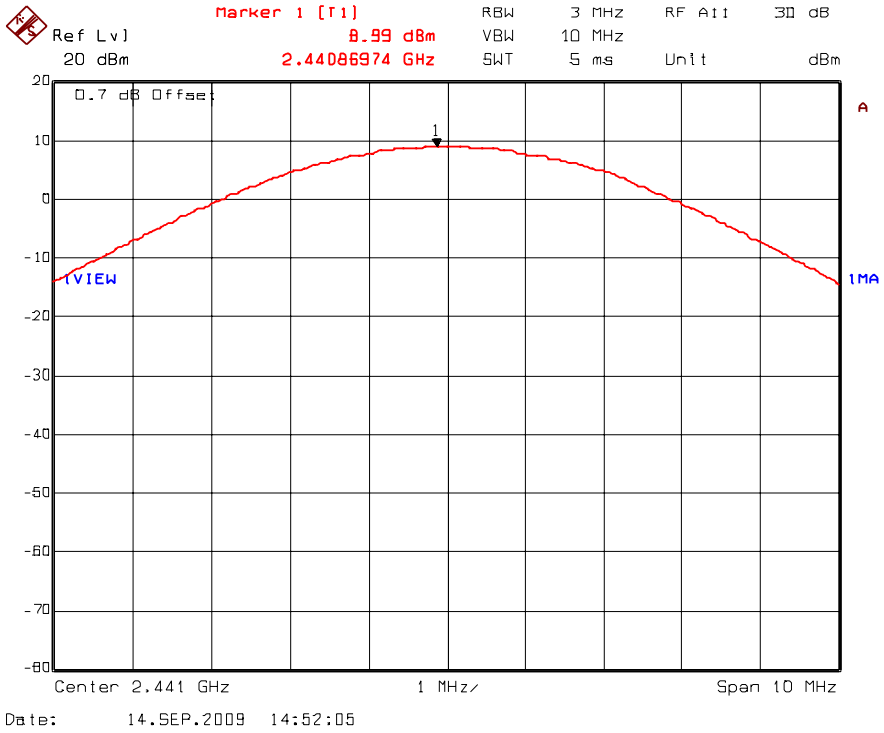
Plot 5.10.4.6. Peak Output Power
Test Frequency: 2480 MHz, π/4 DPQSK modulation



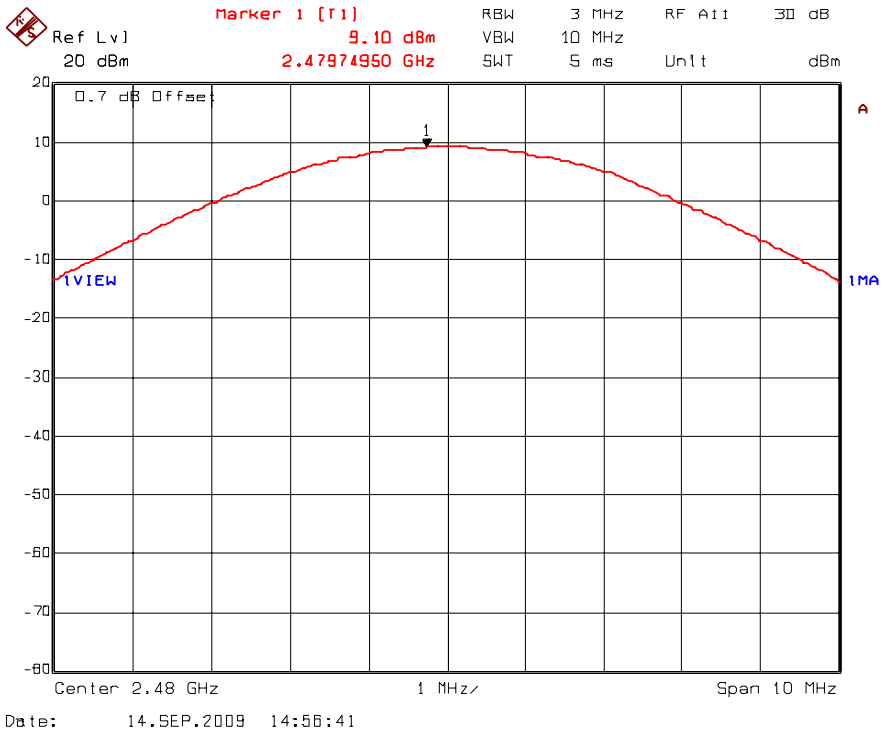
Plot 5.10.4.7. Peak Output Power
Test Frequency: 2402 MHz, 8DPSK modulation



Plot 5.10.4.8. Peak Output Power
Test Frequency: 2441 MHz, 8DPSK modulation



Plot 5.10.4.9. Peak Output Power
Test Frequency: 2480 MHz, 8DPSK modulation



5.11. TRANSMITTER BAND-EDGE & SPURIOUS CONDUCTED EMISSIONS [§ 15.247(d)]

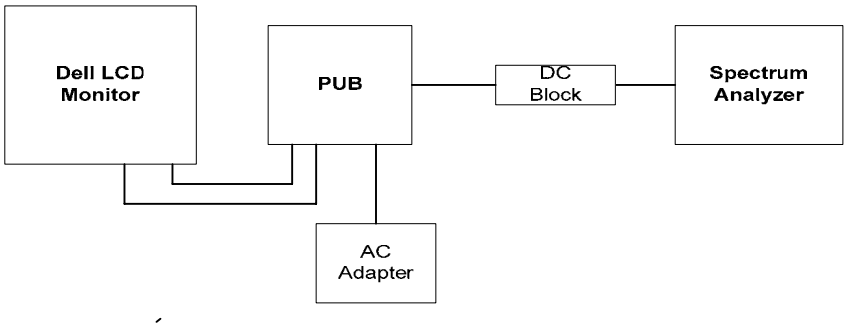
5.11.1. Limits

§ 15.247 (d): In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in § 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).

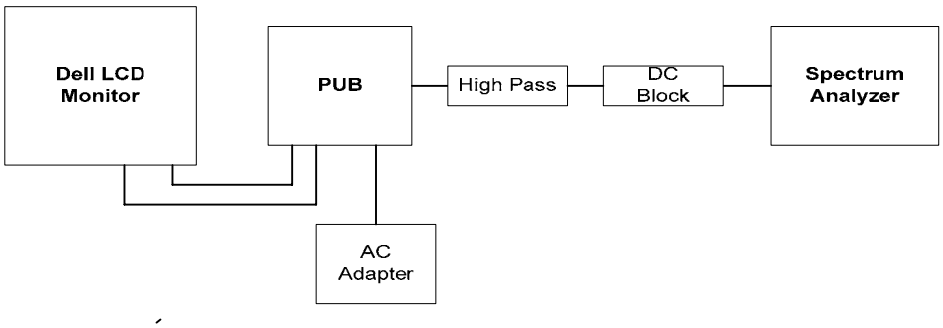
5.11.2. Method of Measurements

FCC Public Notice DA 00-705.

5.11.3. Test Arrangement



< Band-edge RF conducted measurement >



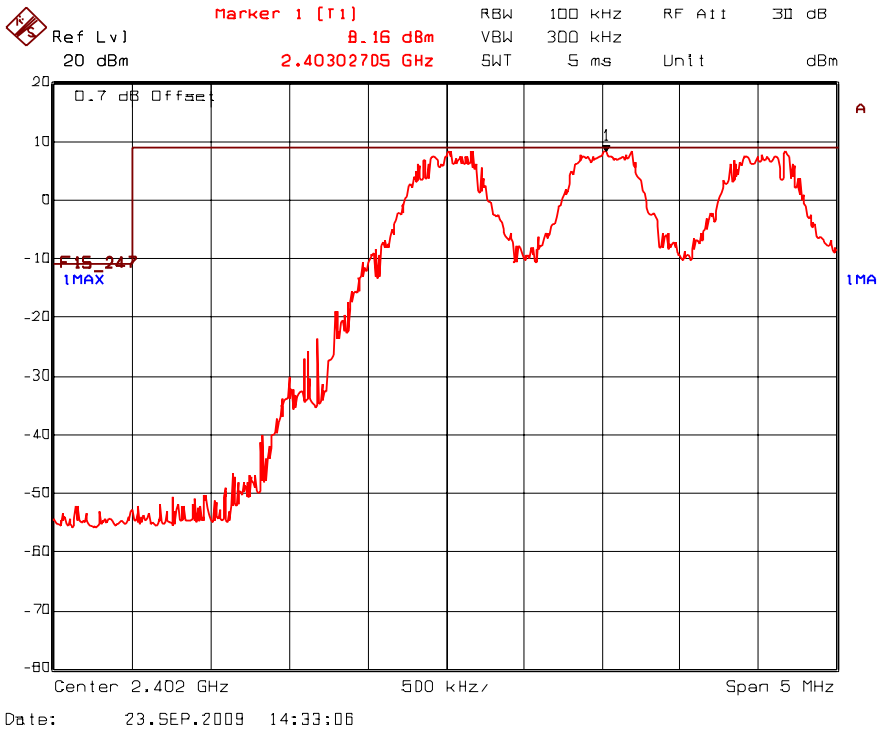
< Spurious RF conducted measurement >

5.11.4. Test Data

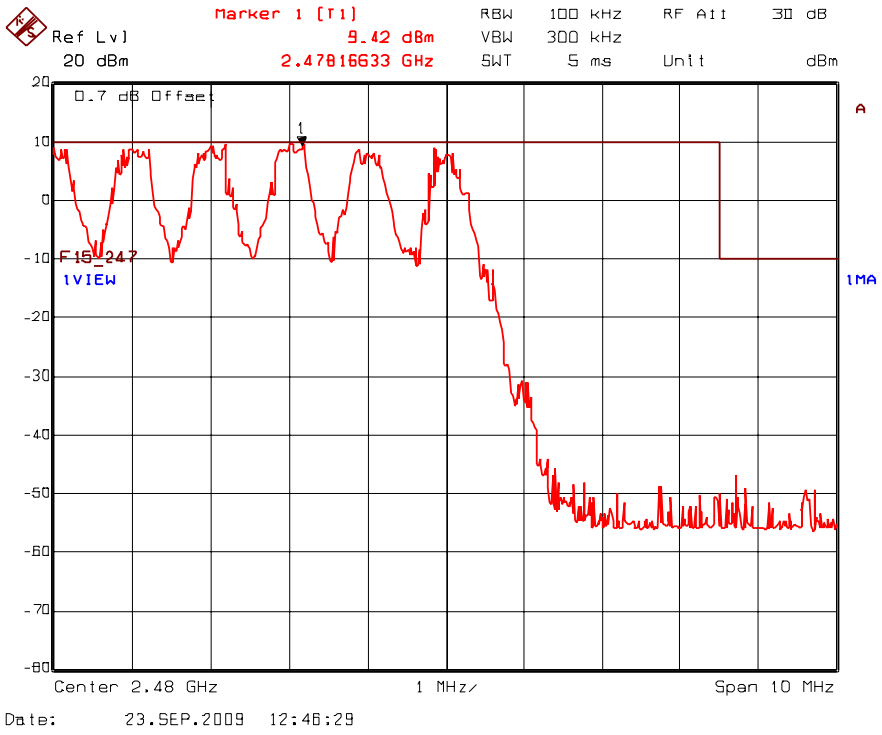
5.11.4.1. Band-Edge RF Conducted Emissions

See the following test data plots for measurement results:

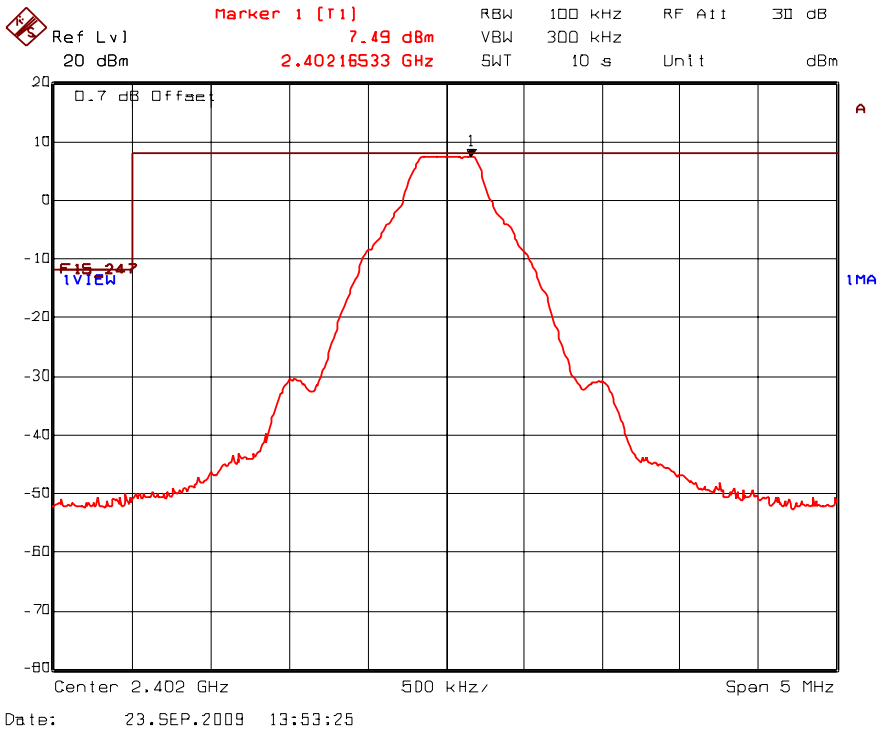
Plot 5.11.4.1.1. Band-Edge RF Conducted Emissions
Hopping Mode, GFSK Modulation, Low End of Frequency Band



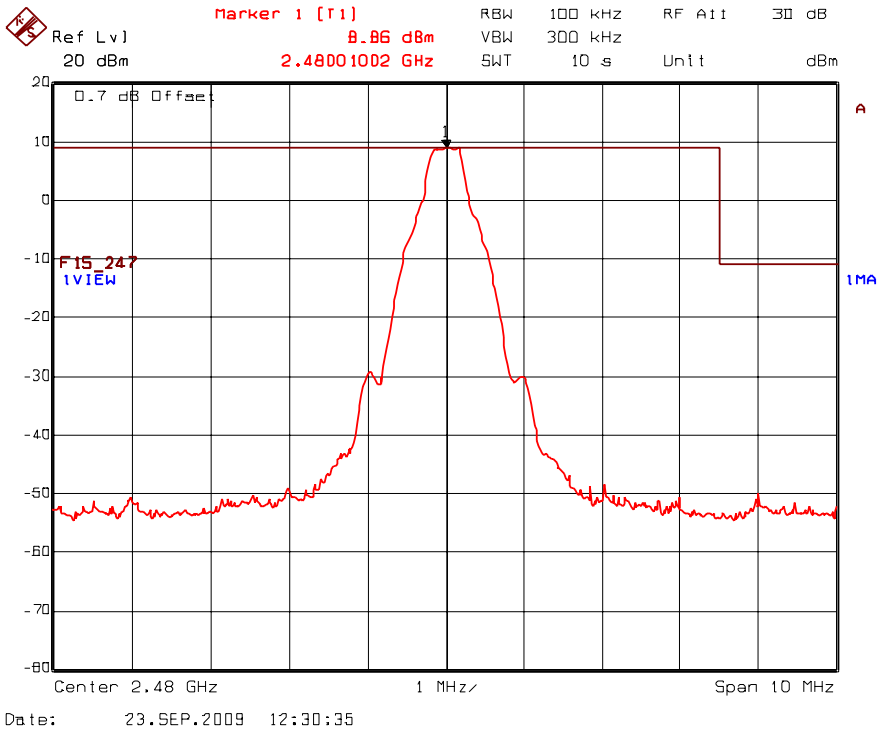
Plot 5.11.4.1.2. Band-Edge RF Conducted Emissions
Hopping Mode, GFSK Modulation, High End of Frequency Band



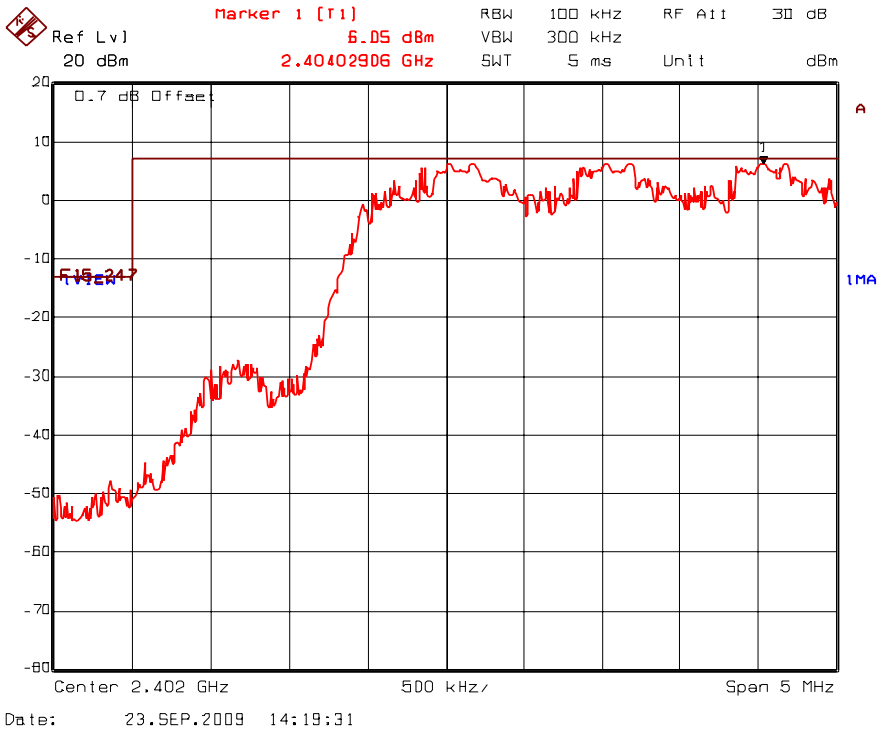
Plot 5.11.4.1.3. Band-Edge RF Conducted Emissions
Continuous Mode, GFSK Modulation, Low End of Frequency Band



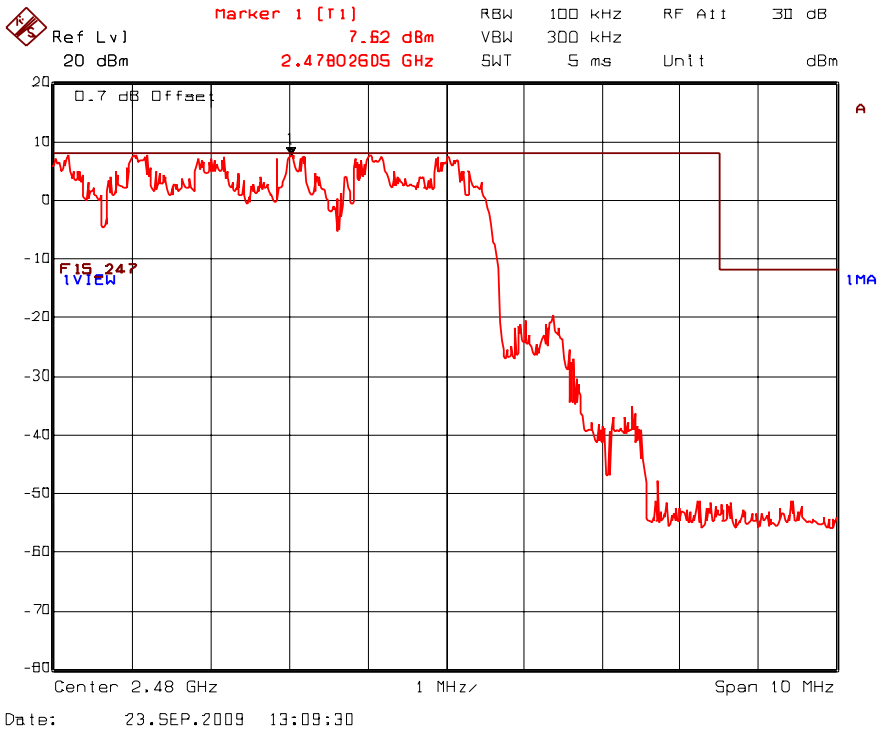
Plot 5.11.4.1.4. Band-Edge RF Conducted Emissions
Continuous Mode, GFSK Modulation, High End of Frequency Band



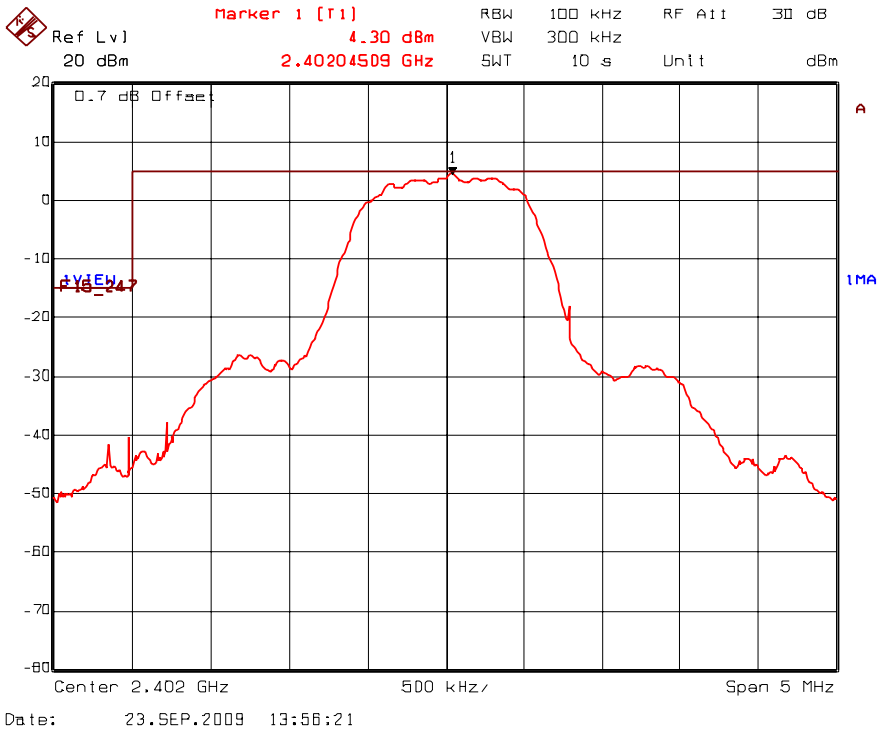
Plot 5.11.4.1.5. Band-Edge RF Conducted Emissions
Hopping Mode, π/4 DPQSK Modulation, Low End of Frequency Band



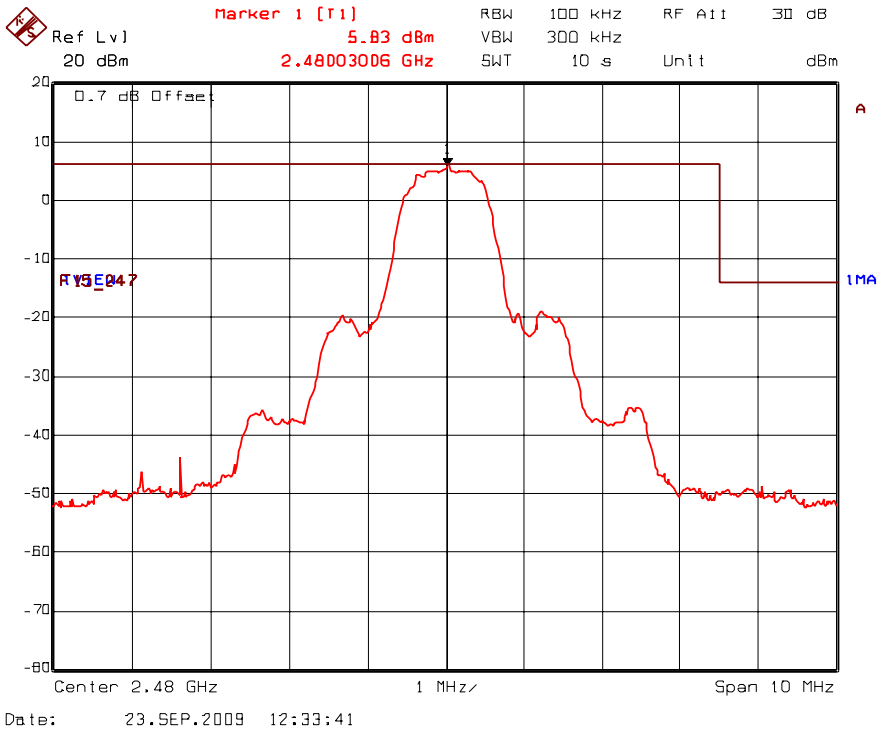
Plot 5.11.4.1.6. Band-Edge RF Conducted Emissions
Hopping Mode, π/4 DPQSK Modulation, High End of Frequency Band



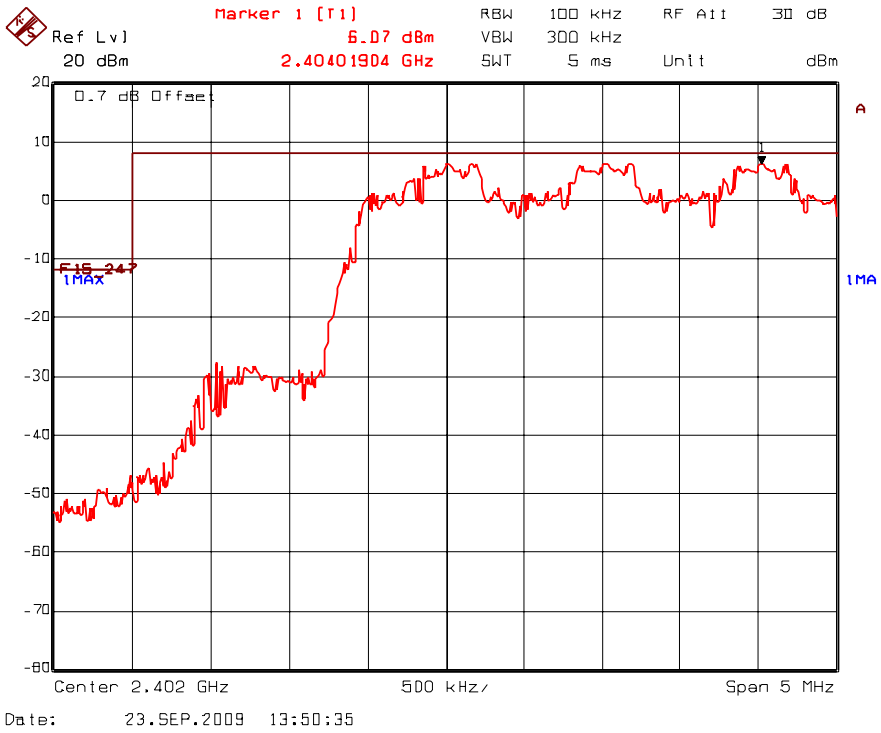
Plot 5.11.4.1.7. Band-Edge RF Conducted Emissions
Continuous Mode, π/4 DPQSK Modulation, Low End of Frequency Band



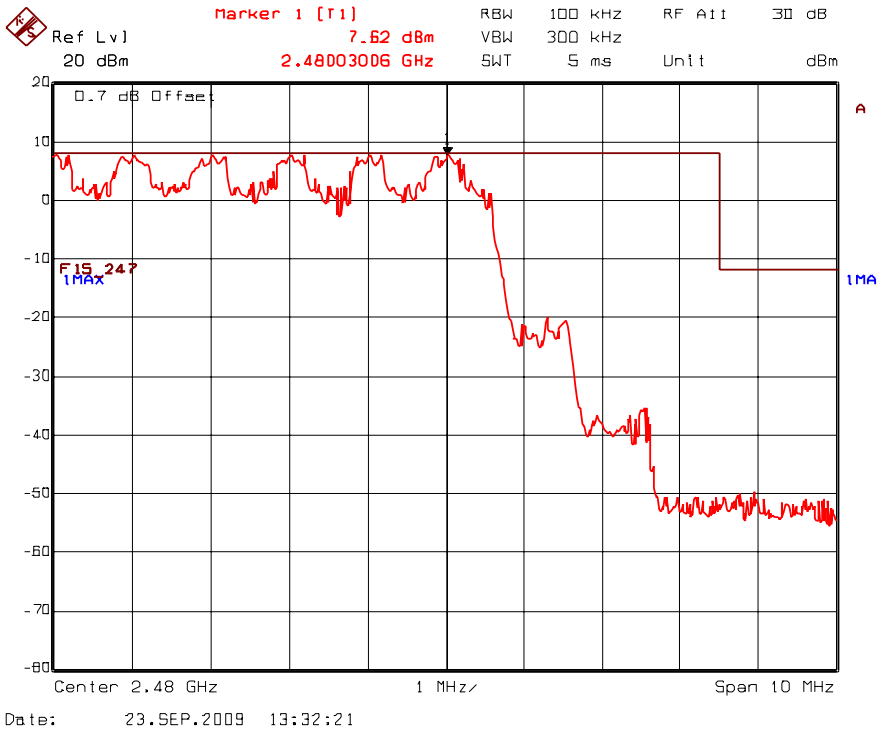
Plot 5.11.4.1.8. Band-Edge RF Conducted Emissions
Continuous Mode, π/4 DPQSK Modulation, High End of Frequency Band



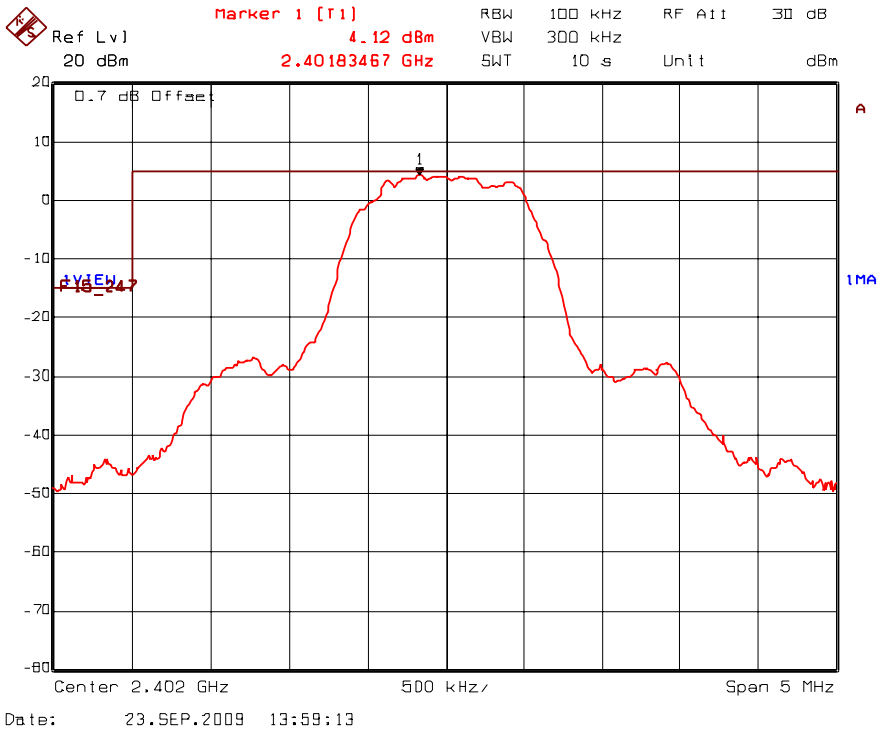
Plot 5.11.4.1.9. Band-Edge RF Conducted Emissions
Hopping Mode, 8DPSK Modulation, Low End of Frequency Band



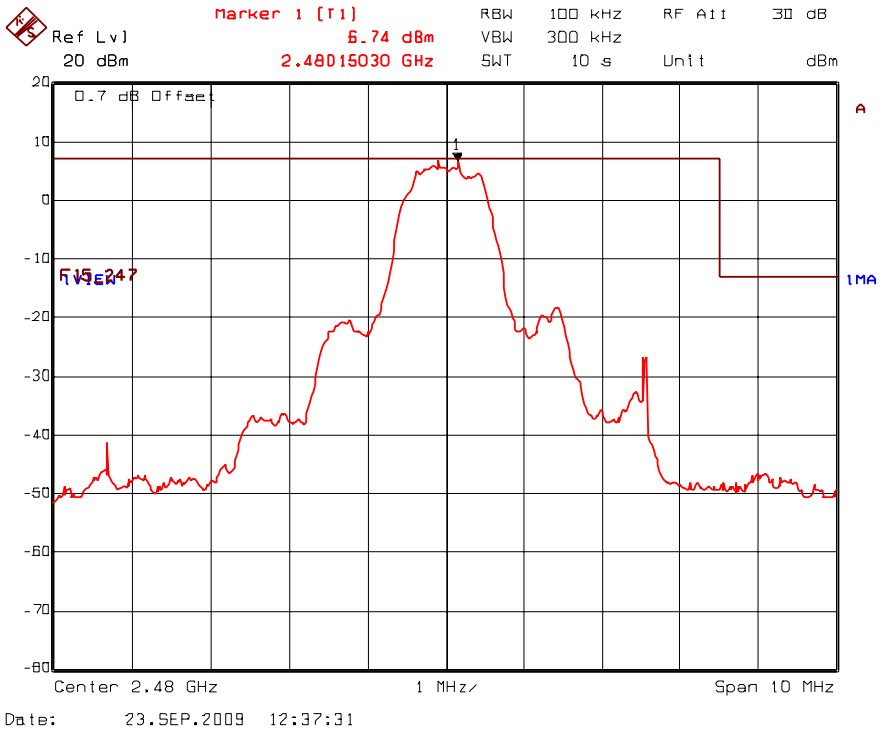
Plot 5.11.4.1.10. Band-Edge RF Conducted Emissions
Hopping Mode, 8DPSK Modulation, High End of Frequency Band



Plot 5.11.4.1.11. Band-Edge RF Conducted Emissions
Continuous Mode, 8DPSK Modulation, Low End of Frequency Band



Plot 5.11.4.1.12. Band-Edge RF Conducted Emissions
Continuous Mode, 8DPSK Modulation, High End of Frequency Band

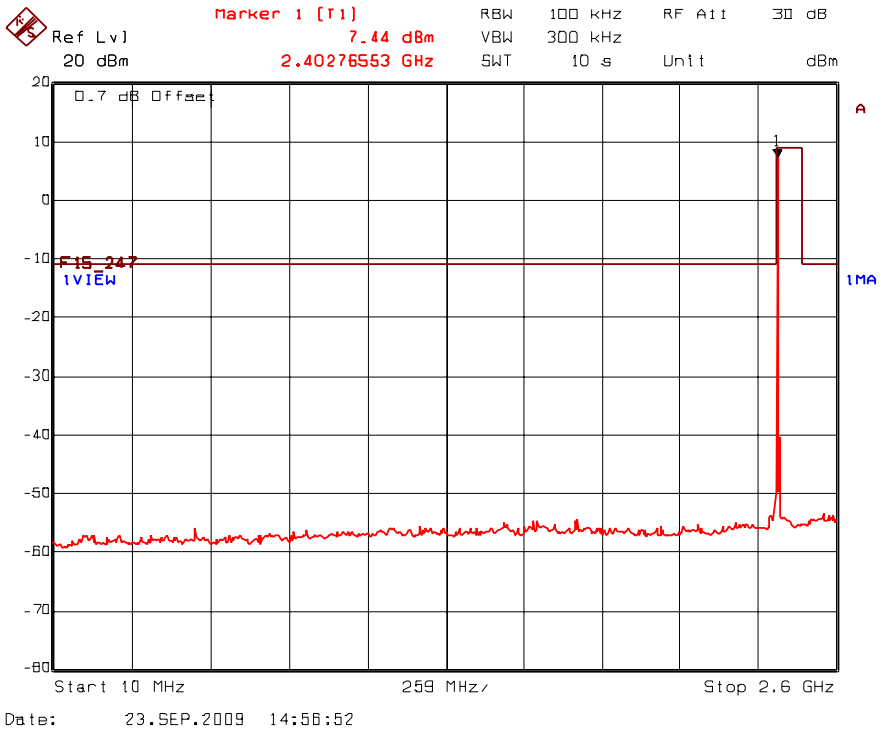


5.11.4.2. Spurious RF Conducted Emissions

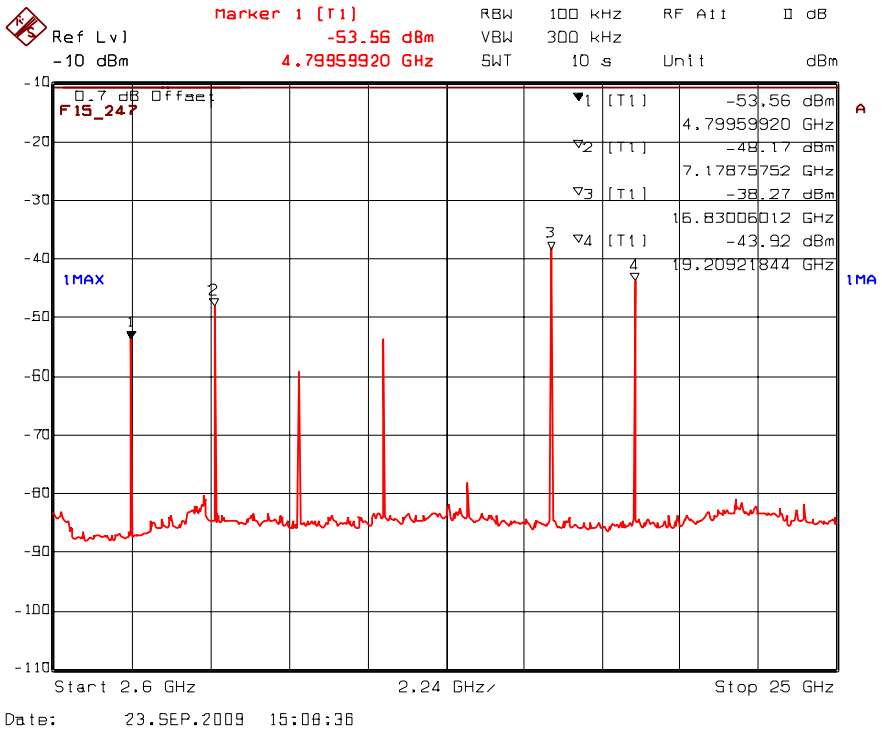
Remark: The emissions were scanned from 10 MHz to 25 GHz; see the following test data plots for measurement results.

Remark: Test results with GFSK modulation are presented here, however Test with other two modulations (π/4 DPQSK Modulation and 8DPSK Modulation) were checked, and it was verified that those results were lower than test results with GFSK modulation.

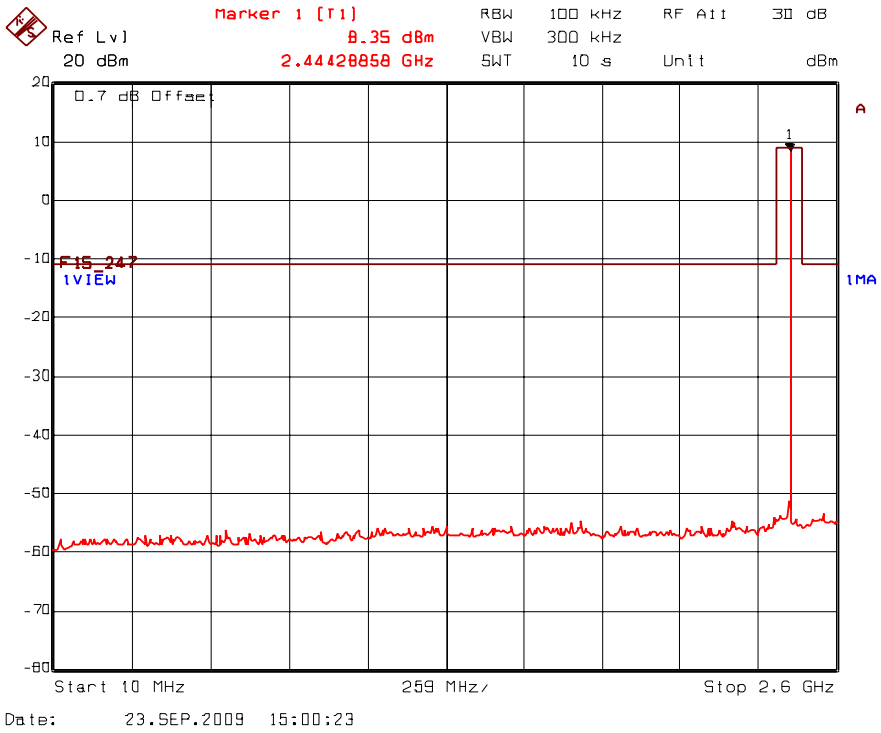
Plot 5.11.4.2.1. Spurious RF Conducted Emissions
Test Frequency: 2402 MHz, GFSK Modulation



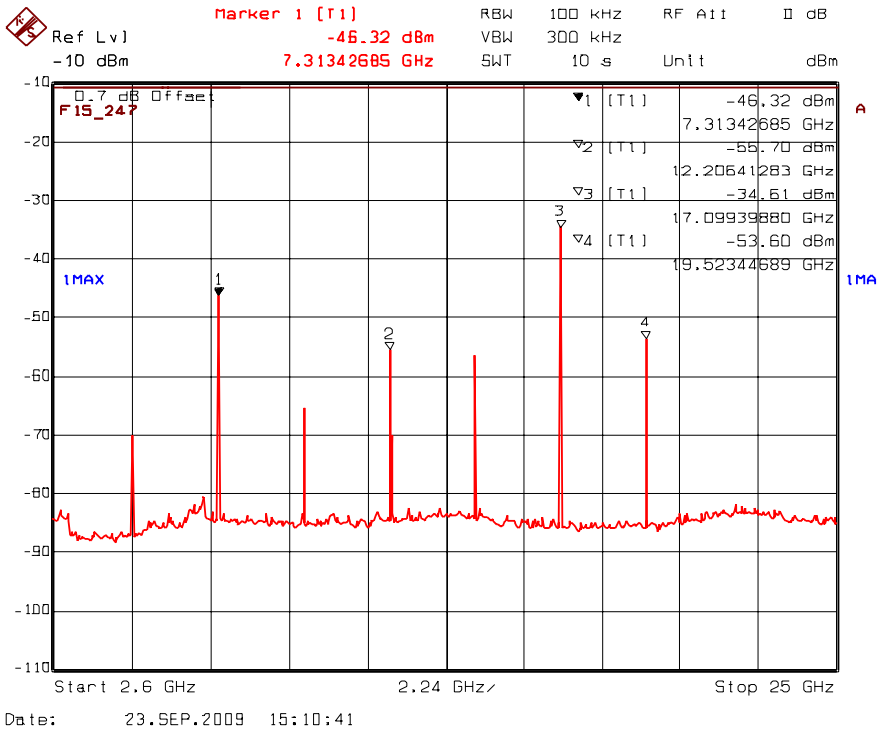
Plot 5.11.4.2.2. Spurious RF Conducted Emissions
Test Frequency: 2402 MHz, GFSK Modulation



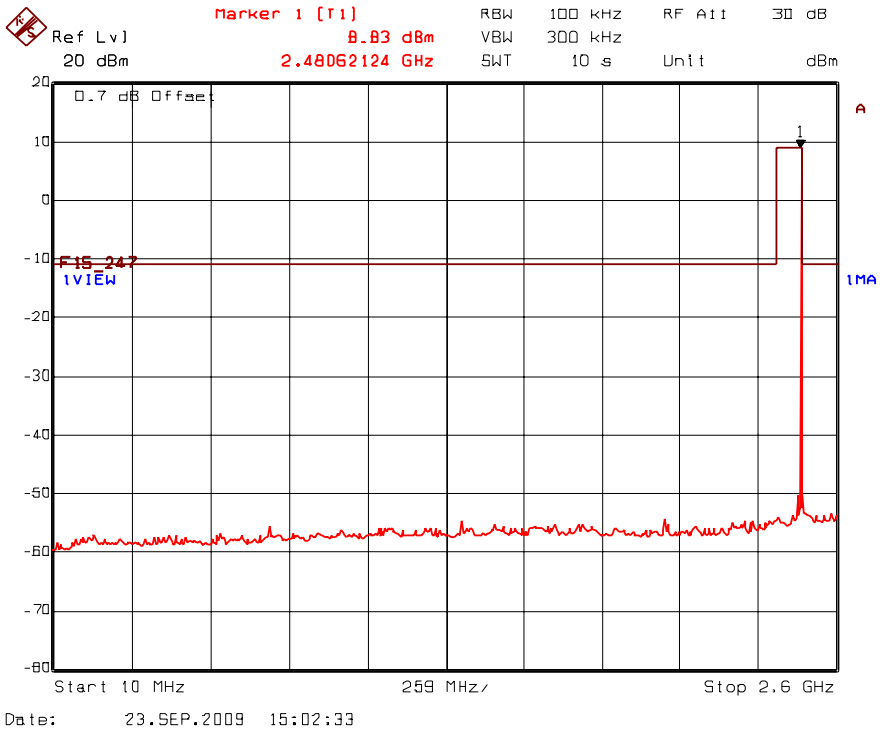
Plot 5.11.4.2.3. Spurious RF Conducted Emissions
Test Frequency: 2441 MHz, GFSK Modulation



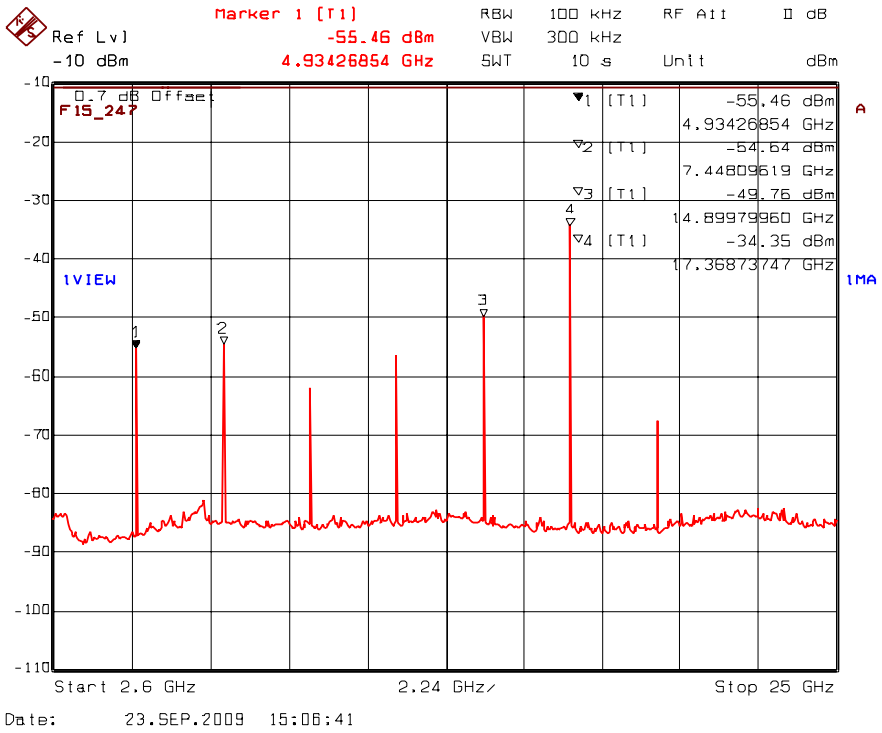
Plot 5.11.4.2.4. Spurious RF Conducted Emissions
Test Frequency: 2441 MHz, GFSK Modulation



Plot 5.11.4.2.5. Spurious RF Conducted Emissions
Test Frequency: 2480 MHz, GFSK Modulation



Plot 5.11.4.2.6. Spurious RF Conducted Emissions
Test Frequency: 2480 MHz, GFSK Modulation



5.12. TRANSMITTER BAND-EDGE & SPURIOUS RADIATED EMISSIONS [§§ 15.247(d), 15.209 & 15.205]

5.12.1. Limits

§ 15.247 (d): In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in § 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).

Section 15.205(a) - Restricted Bands of Operation

MHz	MHz	MHz	GHz
0.090–0.110	16.42–16.423	399.9–410	4.5–5.15
[1] 0.495–0.505	16.69475–16.69525	608–614	5.35–5.46
2.1735–2.1905	16.80425–16.80475	960–1240	7.25–7.75
4.125–4.128	25.5–25.67	1300–1427	8.025–8.5
4.17725–4.17775	37.5–38.25	1435–1626.5	9.0–9.2
4.20725–4.20775	73–74.6	1645.5–1646.5	9.3–9.5
6.215–6.218	74.8–75.2	1660–1710	10.6–12.7
6.26775–6.26825	108–121.94	1718.8–1722.2	13.25–13.4
6.31175–6.31225	123–138	2200–2300	14.47–14.5
8.291–8.294	149.9–150.05	2310–2390	15.35–16.2
8.362–8.366	156.52475–156.52525	2483.5–2500	17.7–21.4
8.37625–8.38675	156.7–156.9	2655–2900	22.01–23.12
8.41425–8.41475	162.0125–167.17	3260–3267	23.6–24.0
12.29–12.293	167.72–173.2	3332–3339	31.2–31.8
12.51975–12.52025	240–285	3345.8–3358	36.43–36.5
12.57675–12.57725	322–335.4	3600–4400	([2])
13.36–13.41.			

[1] Until February 1, 1999, this restricted band shall be 0.490–0.510 MHz.
[2] Above 38.6

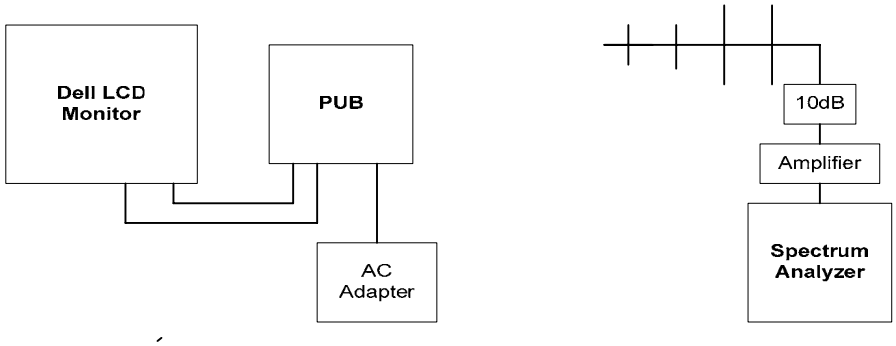
Section 15.209(a)
-- Field Strength Limits within Restricted Frequency Bands --

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 - 0.490	2,400 / F (kHz)	300
0.490 - 1.705	24,000 / F (kHz)	30
1.705 - 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 – 960	200	3
Above 960	500	3

5.12.2. Method of Measurements

KDB Publication No. 558074: Guidance on Measurements for Digital Transmission Systems (47 CFR 15.247)

5.12.3. Test Arrangement



< Spurious radiated emissions measurement >

5.12.4. Test Data

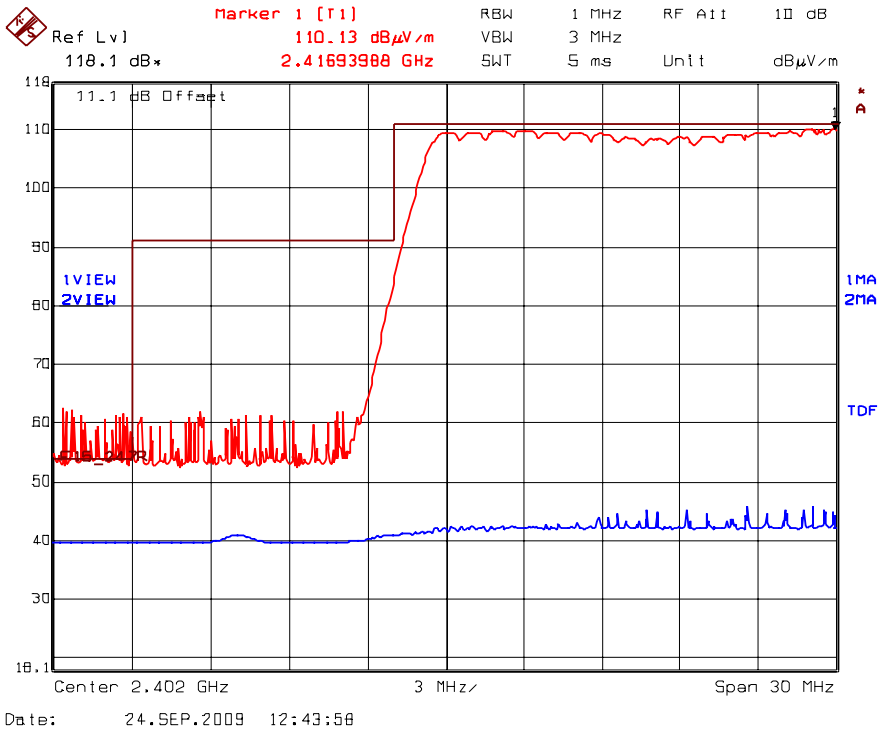
5.12.4.1. Band-Edge RF Radiated Emissions

Remark: *Duty cycle correction factor of -20.6 dB* was applied to determine RF average level per §15.35(c). See the manufacturer's declaration and analysis below for detail of duty cycle.

> *"BT operates in the 2.4GHz ISM band on 79 1 MHz channels (CH0 = 2402MHz to CH78 = 2480MHz). The system is a frequency hopping system with 1600 hops per second which is equal to a channel dwell time of 1 / 1600 or 0.625 msec per hop. Under certain situations, the transmitter can remain on one channel for up to 5 time slots. Assuming a uniform distribution of hopping channels, the maximum number of times a channel can be hopped to during any 100 msec window is 3 times. Thus the maximum worst-case dwell time on one channel is 5 * 3 * 0.625 msec = 9.375 msec*
>
> *Duty cycle correction factor = 20 * log (9.375 msec / 100 msec) = 20 * log (0.09375) = -20.6 dB"*

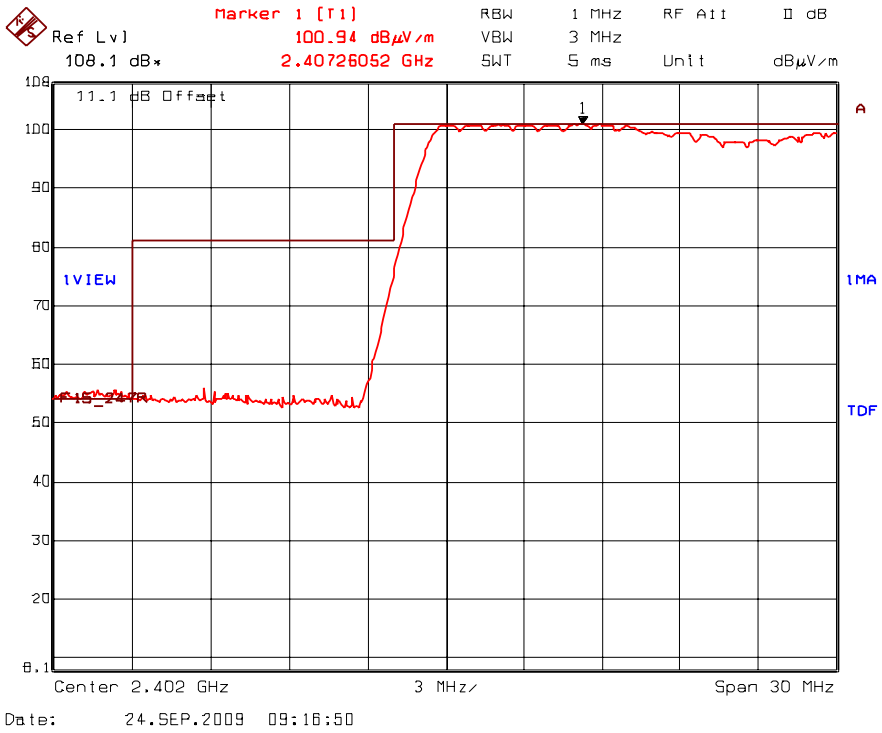
See the following test data plots for measurement results:

Plot 5.12.4.1.1. Band-Edge RF Radiated Emissions
GFSK Modulation, Hopping Mode, Low End of Frequency Band, Horizontal

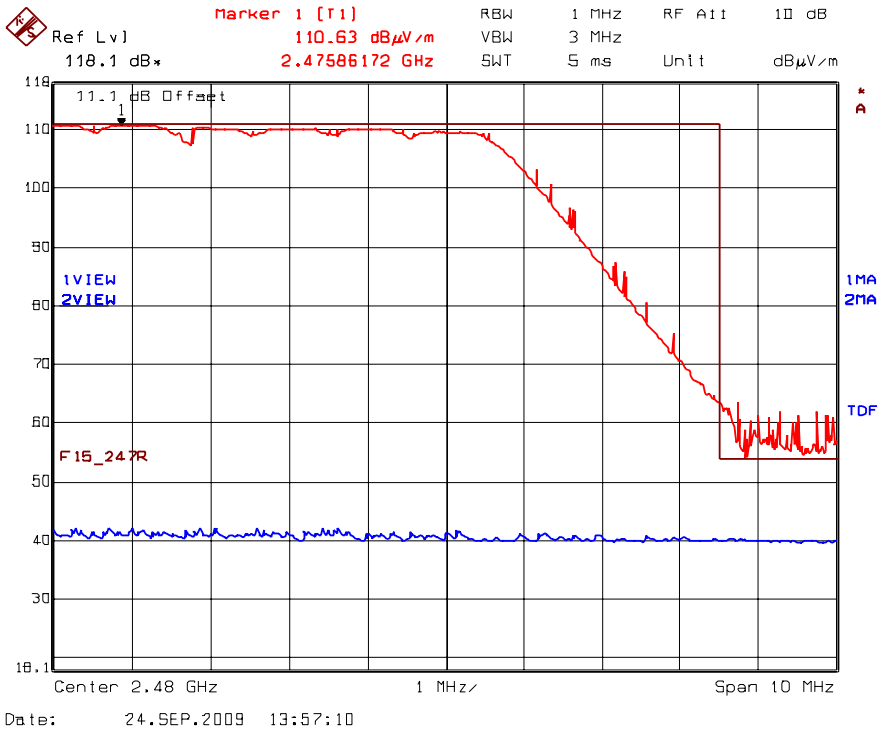


Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 1 MHz, VBW= 10 Hz

Plot 5.12.4.1.2. Band-Edge RF Radiated Emissions
GFSK Modulation, Hopping Mode, Low End of Frequency Band, Vertical

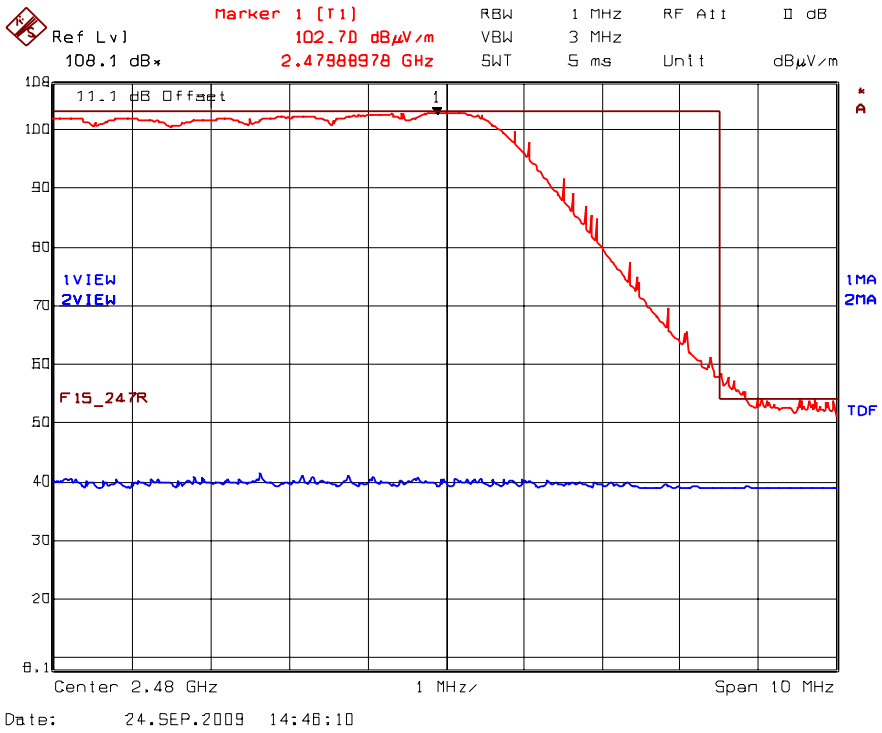


Plot 5.12.4.1.3. Band-Edge RF Conducted Emissions
GFSK Modulation, Hopping Mode, High End of Frequency Band, Horizontal



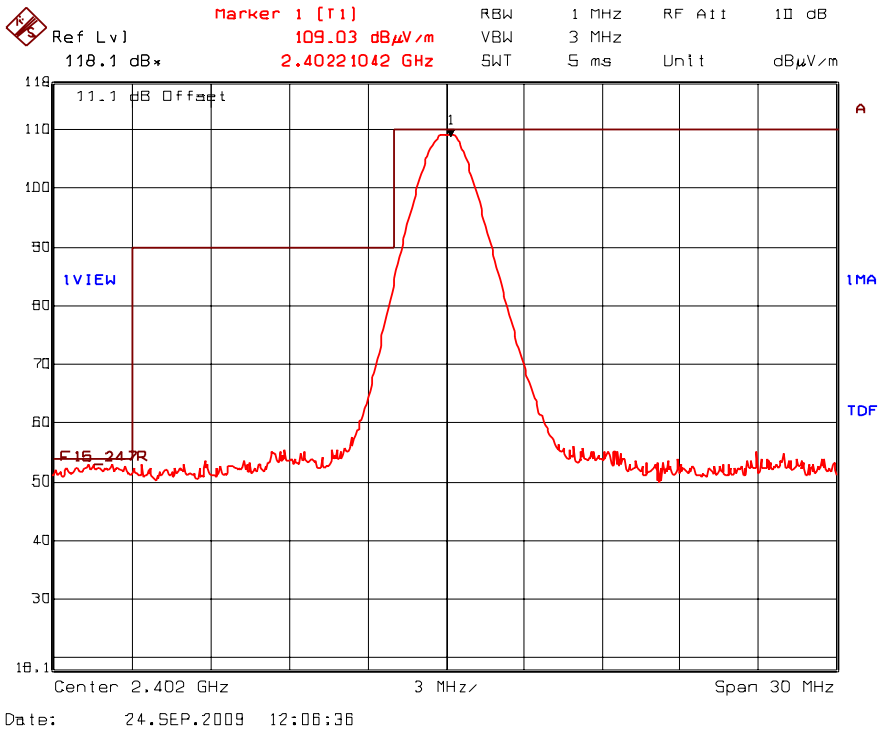
Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 1 MHz, VBW= 10 Hz

Plot 5.12.4.1.4. Band-Edge RF Conducted Emissions
GFSK Modulation, Hopping Mode, High End of Frequency Band, Vertical

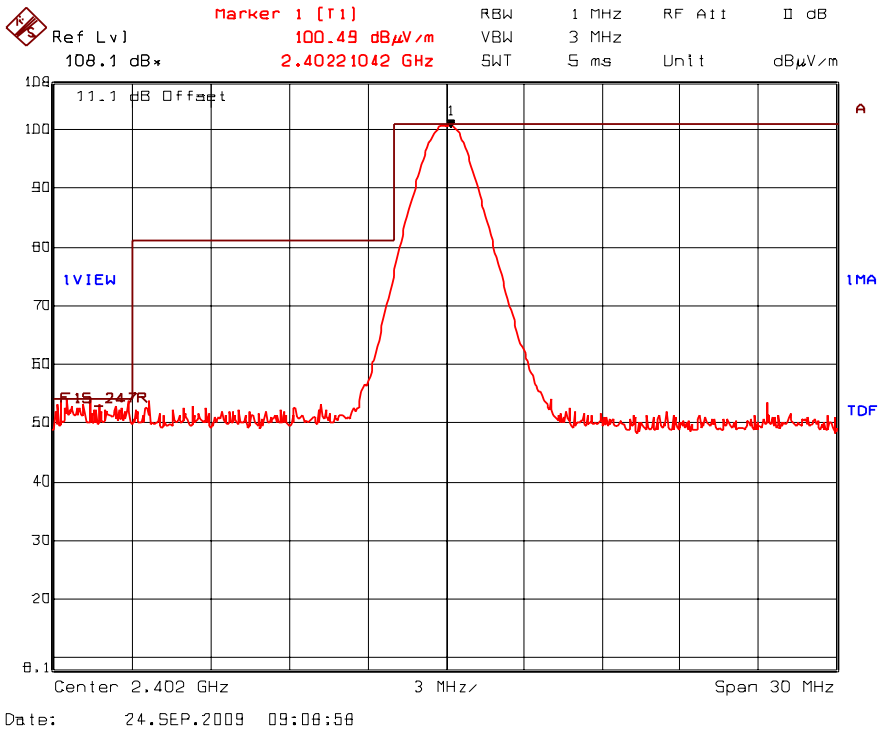


Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 1 MHz, VBW= 10 Hz

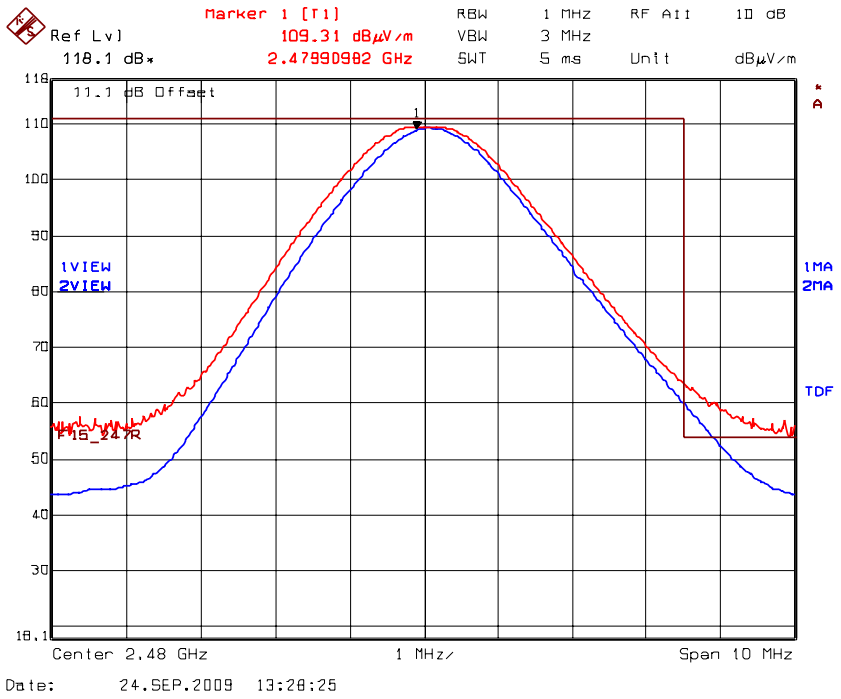
Plot 5.12.4.1.5. Band-Edge RF Conducted Emissions
GFSK Modulation, Continuous Mode, Low End of Frequency Band, Horizontal



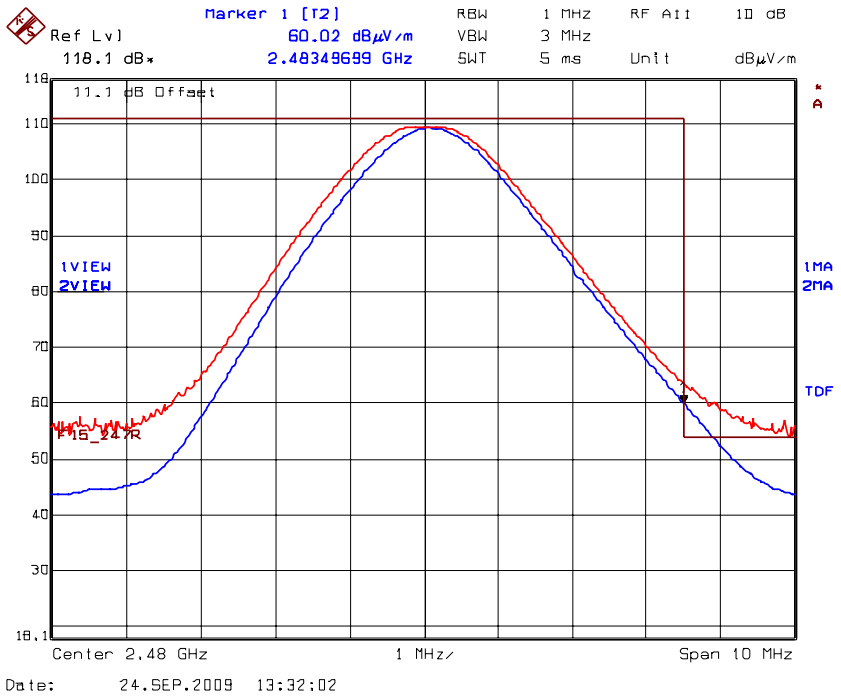
Plot 5.12.4.1.6. Band-Edge RF Conducted Emissions
GFSK Modulation, Continuous Mode, Low End of Frequency Band, Vertical



Plot 5.12.4.1.7. Band-Edge RF Conducted Emissions
GFSK Modulation, Continuous Mode, High End of Frequency Band, Horizontal

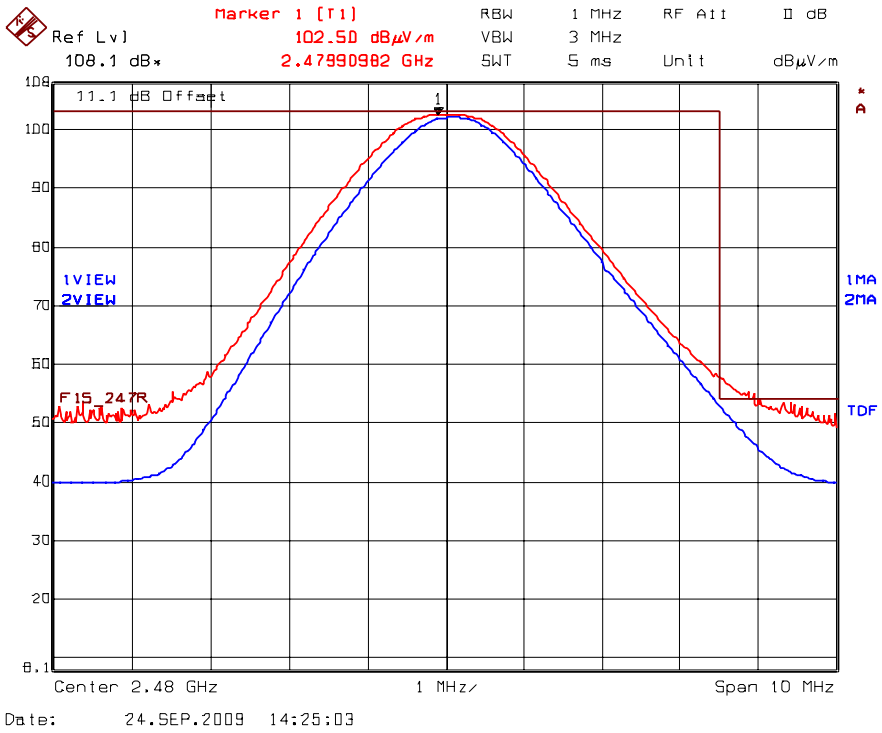


Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 1 MHz, VBW= 10 Hz



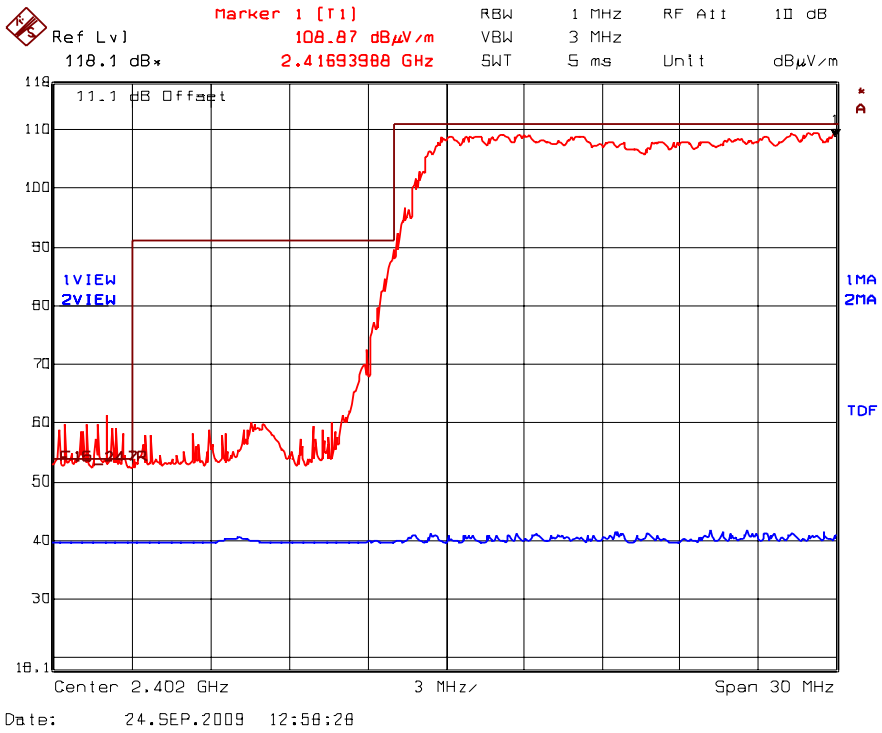
Duty Cycle Correction Factor: -20.6dB
RF average level 60.02dBµV/m – 20.6dB= 39.42dBµV/m (where limit is 54dBµV/m)

Plot 5.12.4.1.8. Band-Edge RF Conducted Emissions
GFSK Modulation, Continuous Mode, High End of Frequency Band, Vertical



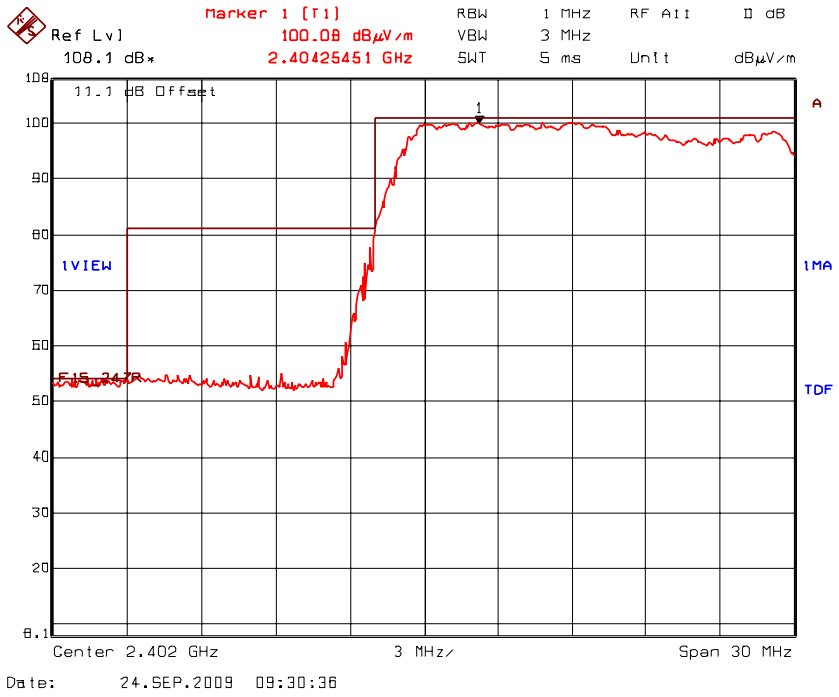
Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 1 MHz, VBW= 10 Hz

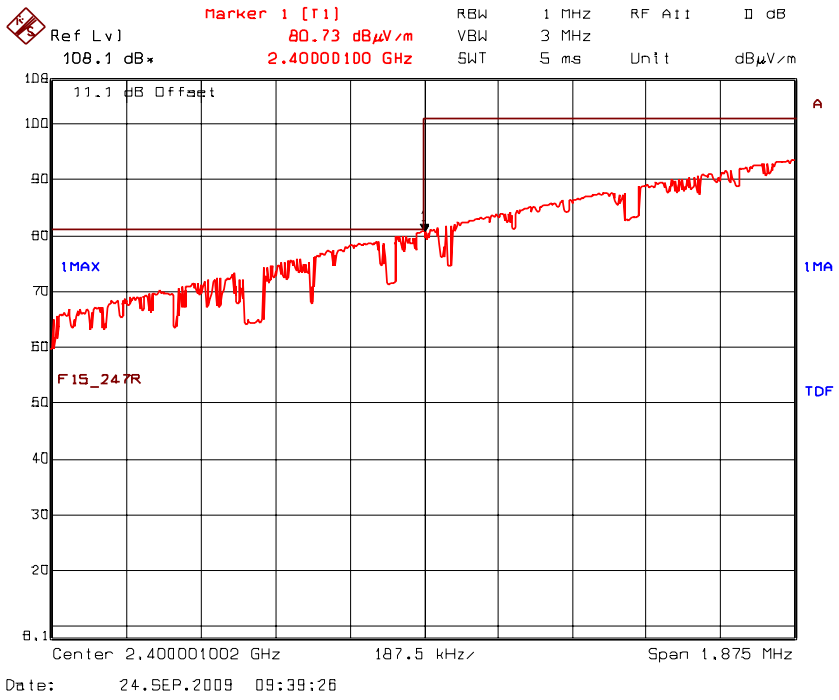
Plot 5.12.4.1.9. Band-Edge RF Radiated Emissions
π/4 DPQSK Modulation, Hopping Mode, Low End of Frequency Band, Horizontal



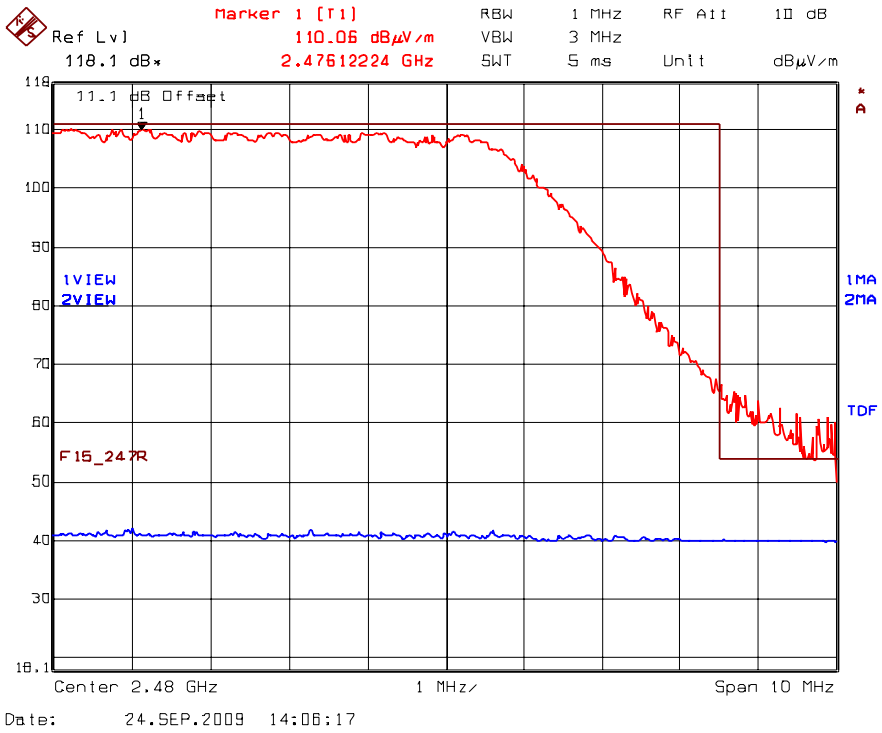
Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 1 MHz, VBW= 10 Hz

Plot 5.12.4.1.10. Band-Edge RF Radiated Emissions
π/4 DPQSK Modulation, Hopping Mode, Low End of Frequency Band, Vertical



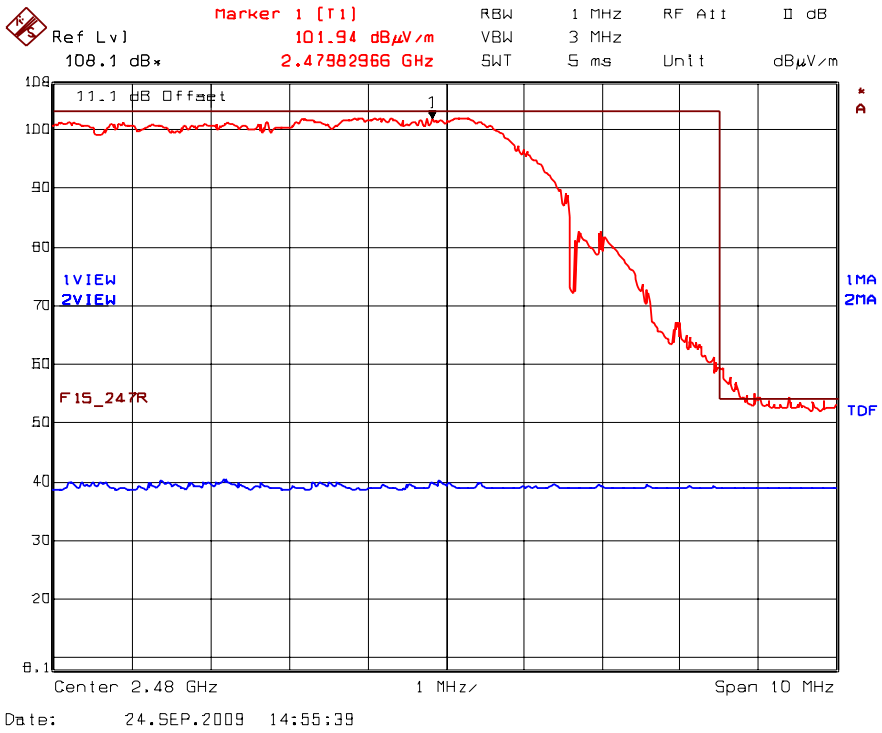

Marker 1 [T1]
80.73 dBµV/m
2.40000100 GHz
RBW 1 MHz
VBW 3 MHz
SWT 5 ms
RF Att 0 dB
Unit dBµV/m
Ref Lvl
108.1 dB*
11.1 dB Offset
A
1MAX
1MA
F15_247R
TDF
Center 2.400001002 GHz
187.5 kHz/
Span 1.875 MHz
Date: 24.SEP.2009 09:39:26

Plot 5.12.4.1.11. Band-Edge RF Conducted Emissions
π/4 DPQSK Modulation, Hopping Mode, High End of Frequency Band, Horizontal



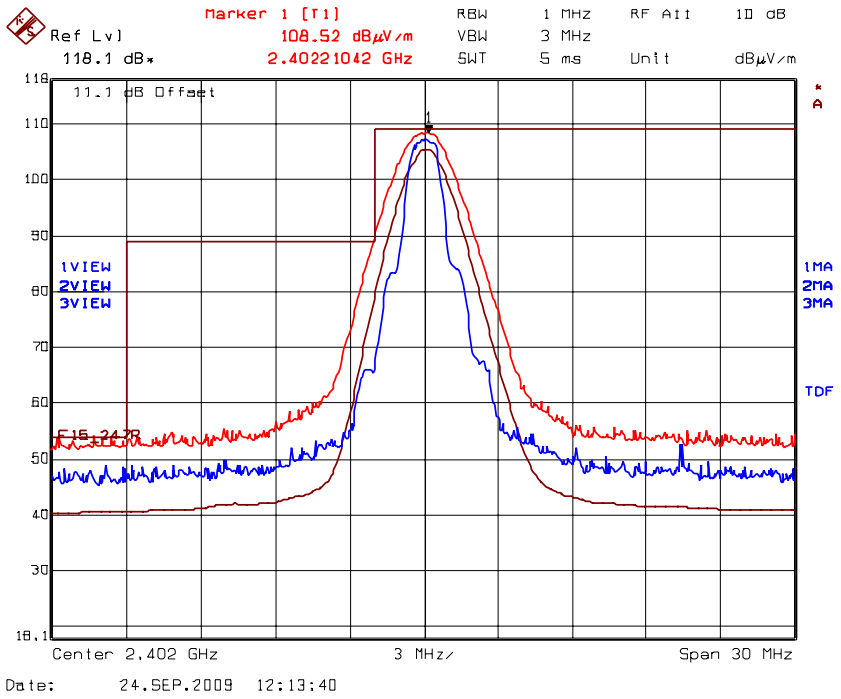
Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 1 MHz, VBW= 10 Hz

Plot 5.12.4.1.12. Band-Edge RF Conducted Emissions
π/4 DPQSK Modulation, Hopping Mode, High End of Frequency Band, Vertical

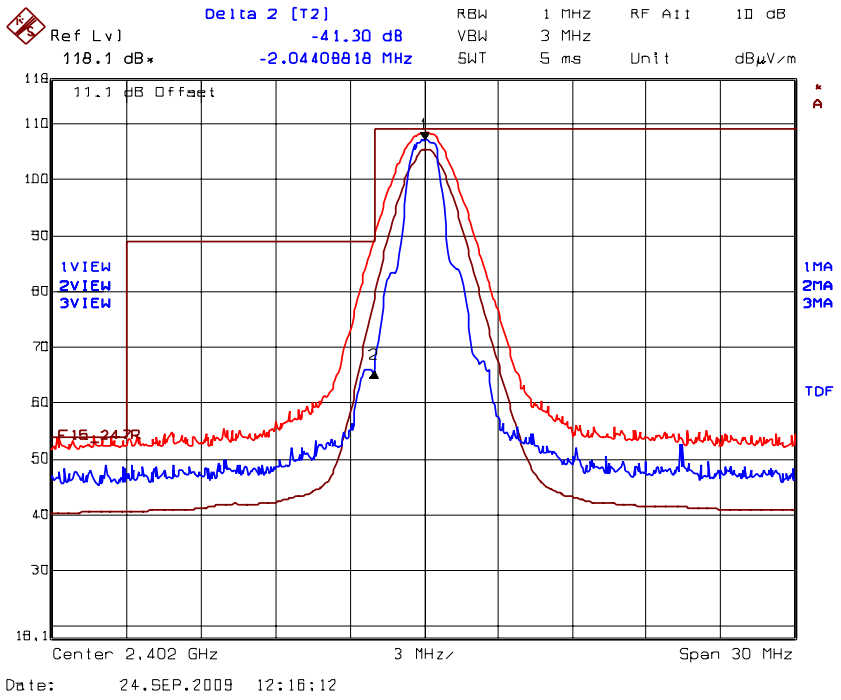


Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 1 MHz, VBW= 10 Hz

Plot 5.12.4.1.13. Band-Edge RF Conducted Emissions
π/4 DPQSK Modulation, Continuous Mode, Low End of Frequency Band, Horizontal

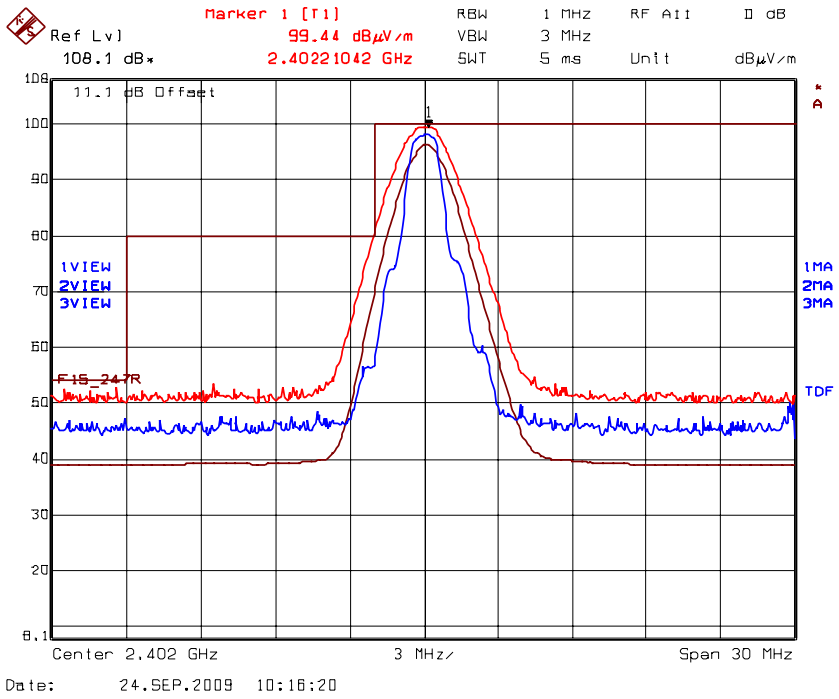


Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 300 kHz, VBW= 1 MHz
Trace 3: RBW= 1 MHz, VBW= 10 Hz

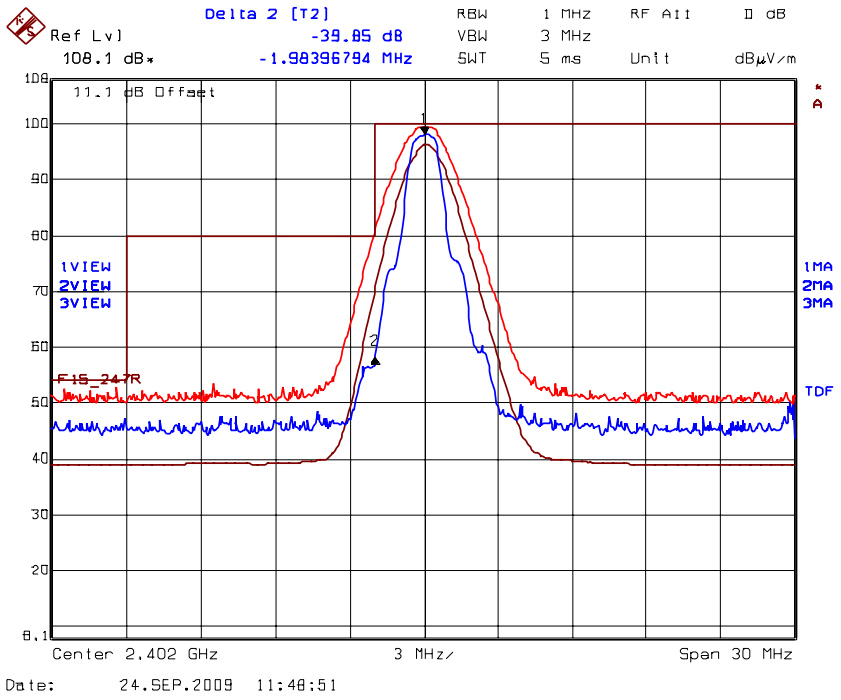


Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 300 kHz, VBW= 1 MHz, Delta (Peak to Band-Edge): -41.30dB
Trace 3: RBW= 1 MHz, VBW= 10 Hz
Peak Band-Edge at 2400 MHz: Peak= 108.52dBuV/m – 41.30dB = 67.22dBuV/m
(where limit is 88.52dBuV/m)

Plot 5.12.4.1.14. Band-Edge RF Conducted Emissions
π/4 DPQSK Modulation, Continuous Mode, Low End of Frequency Band, Vertical



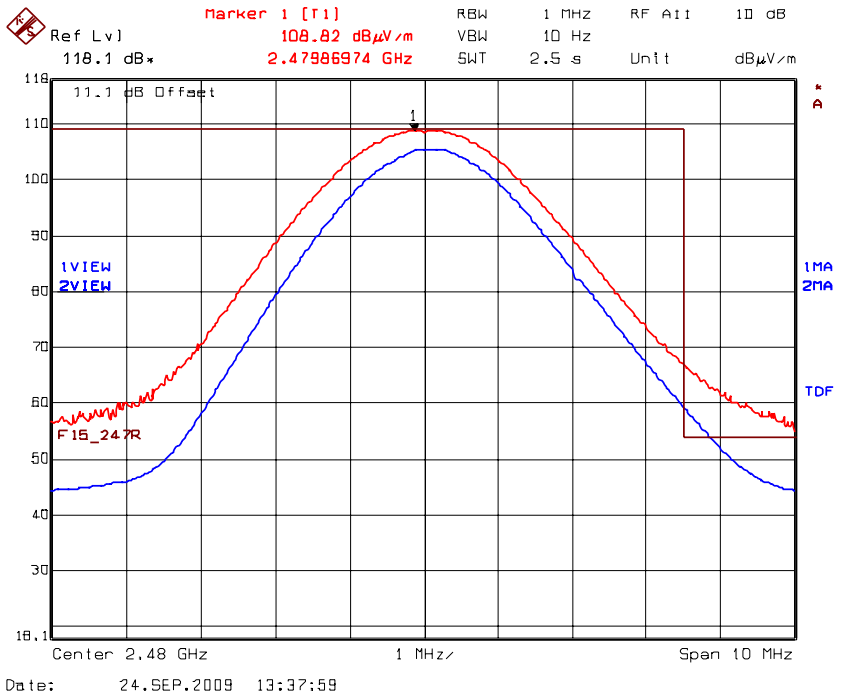
Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 300 kHz, VBW= 1 MHz
Trace 3: RBW= 1 MHz, VBW= 10 Hz



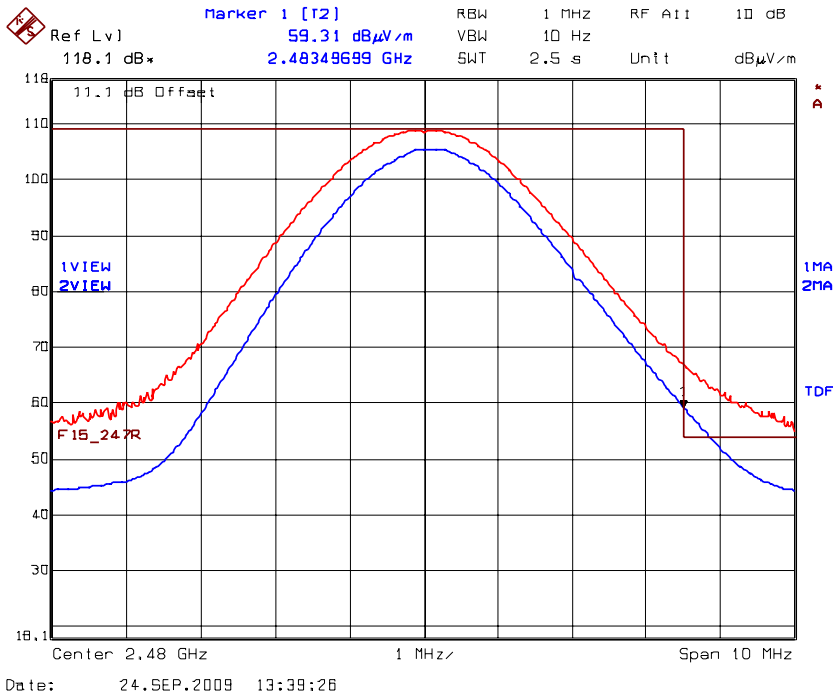
Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 300 kHz, VBW= 1 MHz, Delta (Peak to Band-Edge): -39.85dB
Trace 3: RBW= 1 MHz, VBW= 10 Hz

Peak Band-Edge at 2400 MHz: Peak= 99.44dBuV/m – 39.85dB= 59.59dBuV/m
(where limit is 79.44dBuV/m)

Plot 5.12.4.1.15. Band-Edge RF Conducted Emissions
π/4 DPQSK Modulation, Continuous Mode, High End of Frequency Band, Horizontal



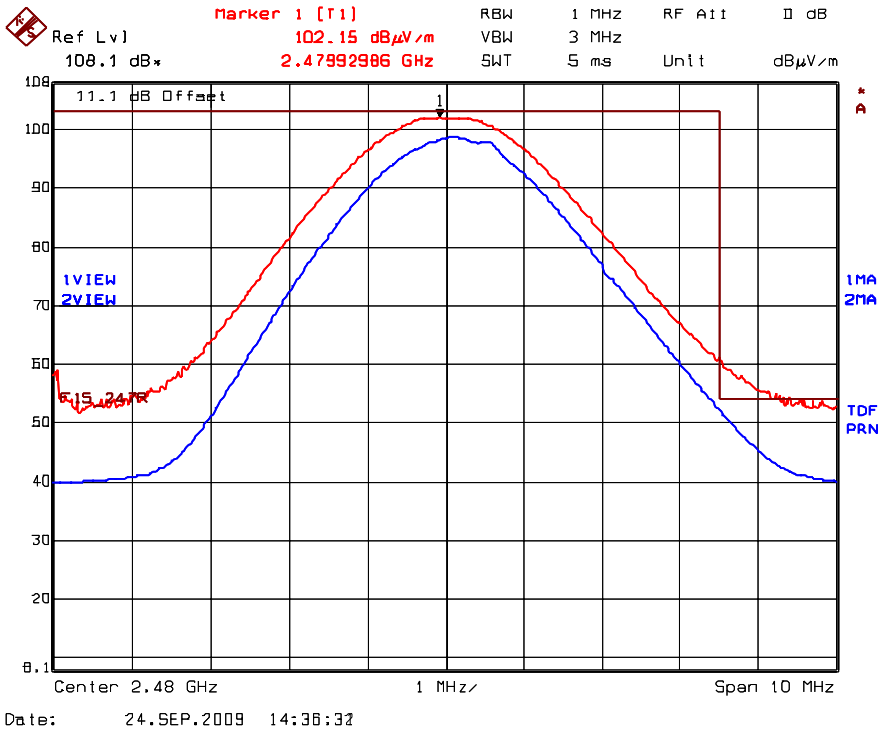
Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 1 MHz, VBW= 10 Hz



Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 1 MHz, VBW= 10 Hz

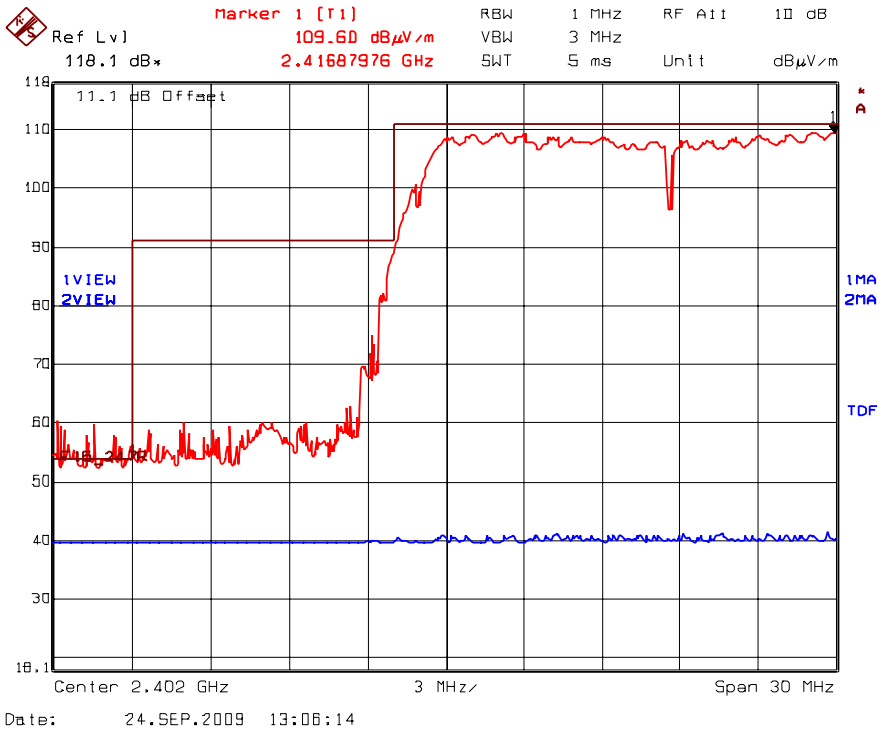
Duty Cycle Correction Factor: -20.6dB
RF average level 59.31dBµV/m – 20.6dB= 38.71dBµV/m (where limit is 54dBµV/m)

Plot 5.12.4.1.16. Band-Edge RF Conducted Emissions
π/4 DPQSK Modulation, Continuous Mode, High End of Frequency Band, Vertical



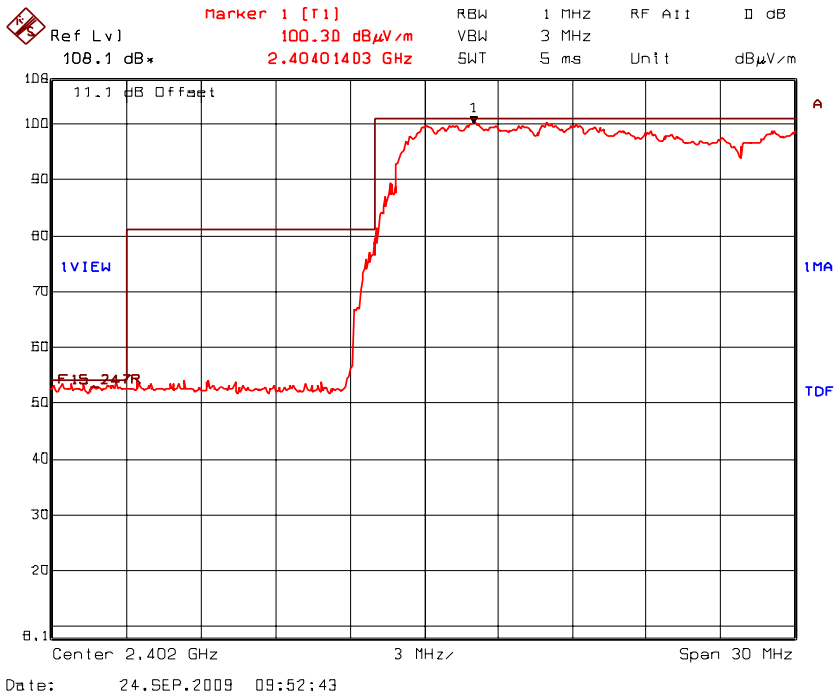
Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 1 MHz, VBW= 10 Hz

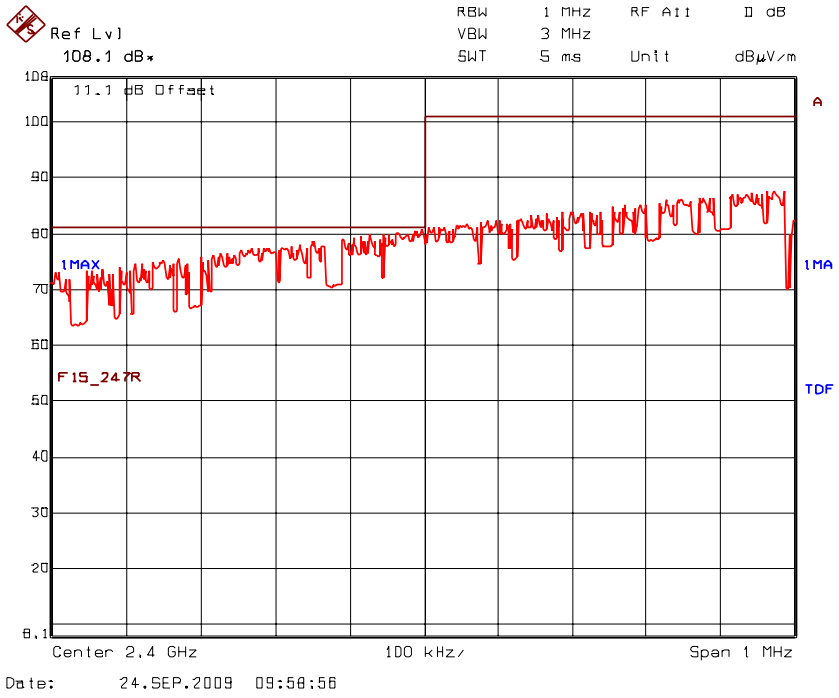
Plot 5.12.4.1.17. Band-Edge RF Radiated Emissions
8DPSK Modulation, Hopping Mode, Low End of Frequency Band, Horizontal



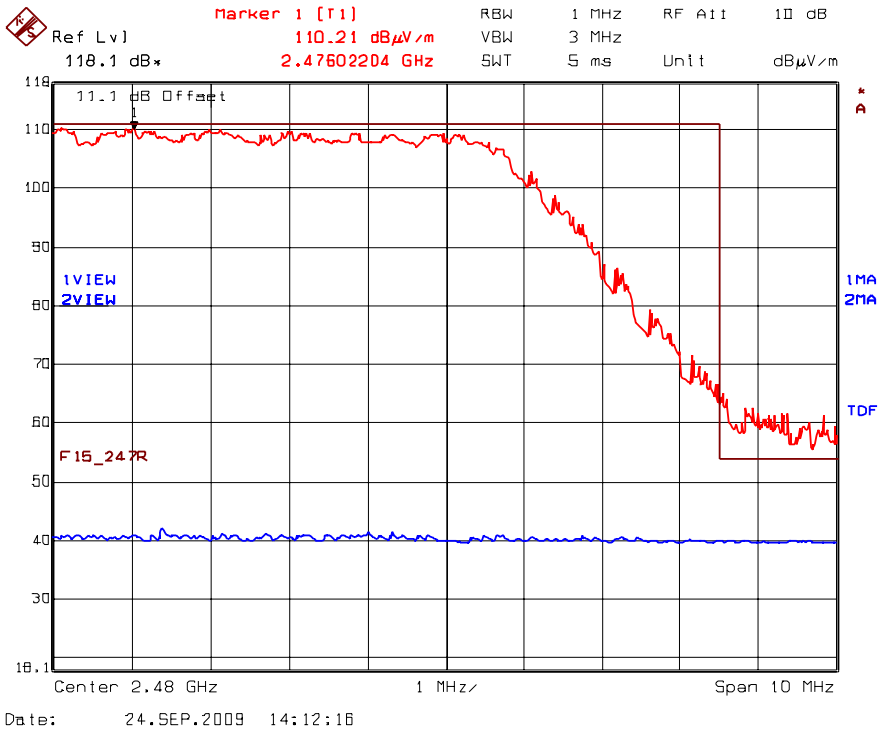
Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 1 MHz, VBW= 10 Hz

Plot 5.12.4.1.18. Band-Edge RF Radiated Emissions
8DPSK Modulation, Hopping Mode, Low End of Frequency Band, Vertical



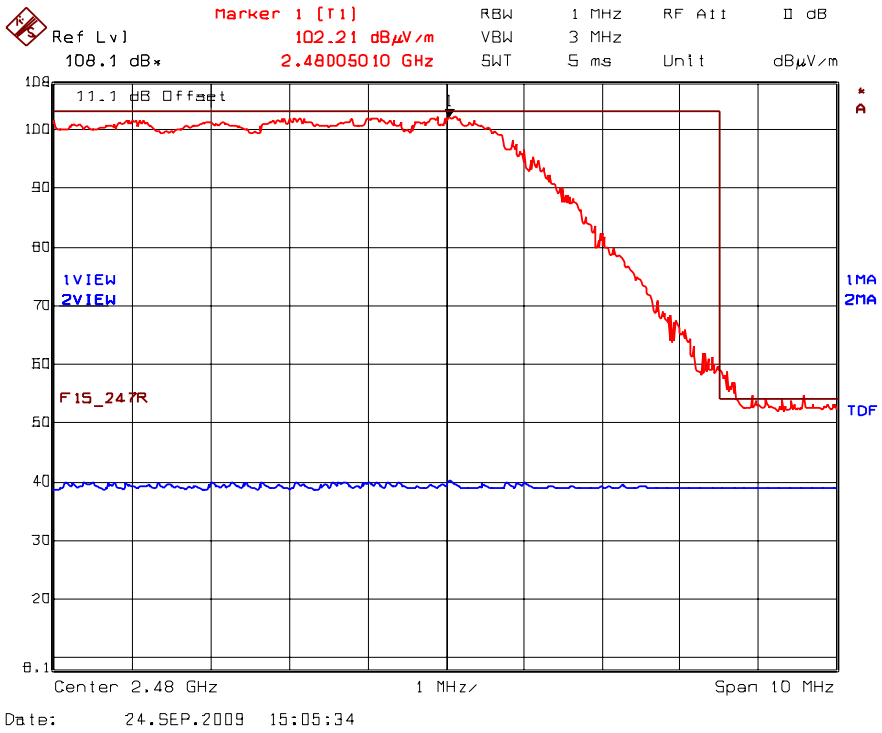

RBW 1 MHz
VBW 3 MHz
SWT 5 ms
RF Att 0 dB
Unit dBµV/m
Ref Lvl
108.1 dB*
11.1 dB Offset
A
lMAX
lMA
TDF
F15_247R
110
100
90
80
70
60
50
40
30
20
8.1
Center 2.4 GHz
100 kHz/
Span 1 MHz
Date: 24.SEP.2009 09:58:56

Plot 5.12.4.1.19. Band-Edge RF Conducted Emissions
8DPSK Modulation, Hopping Mode, High End of Frequency Band, Horizontal



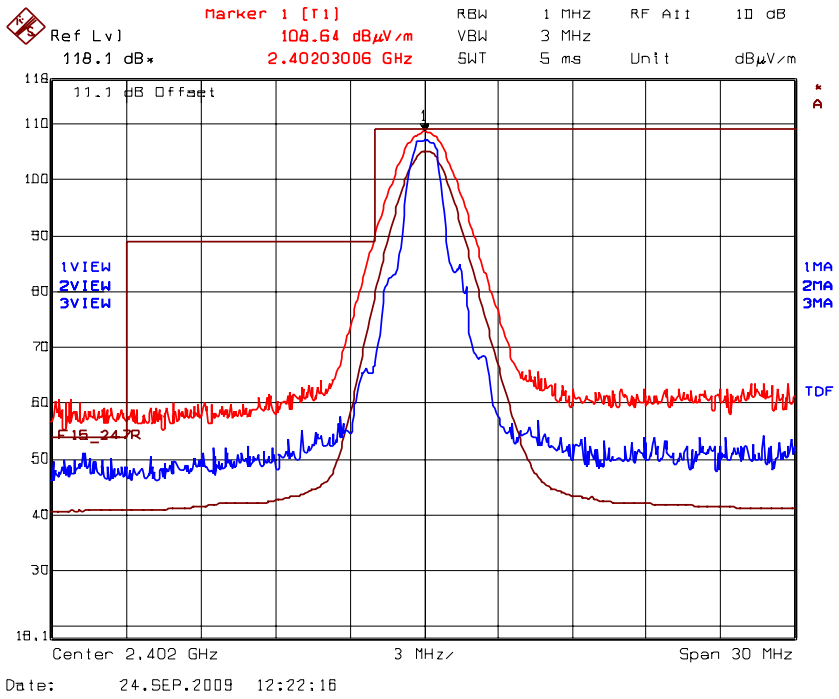
Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 1 MHz, VBW= 10 Hz

Plot 5.12.4.1.20. Band-Edge RF Conducted Emissions
8DPSK Modulation, Hopping Mode, High End of Frequency Band, Vertical

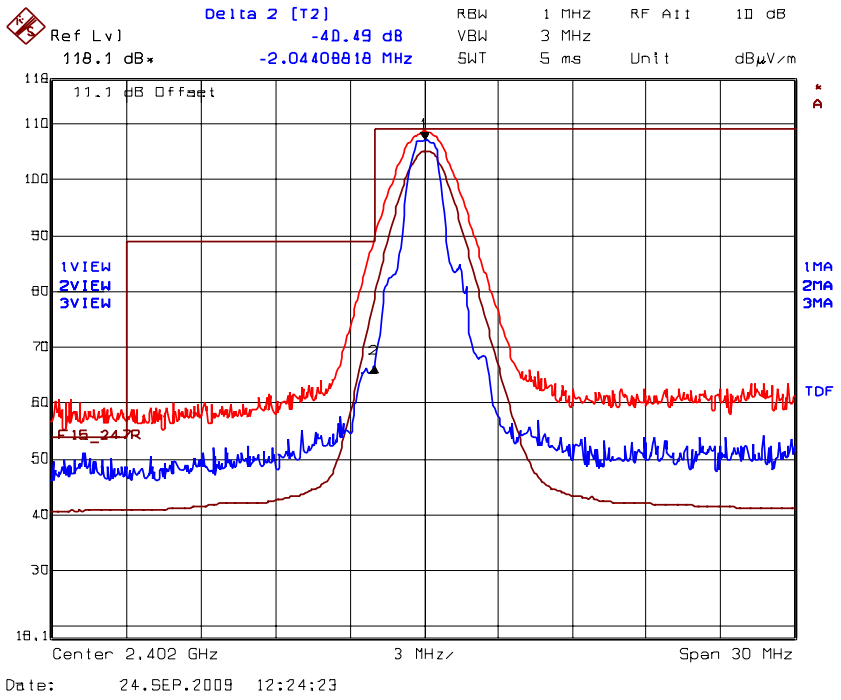


Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 1 MHz, VBW= 10 Hz

Plot 5.12.4.1.21. Band-Edge RF Conducted Emissions
8DPSK Modulation, Continuous Mode, Low End of Frequency Band, Horizontal

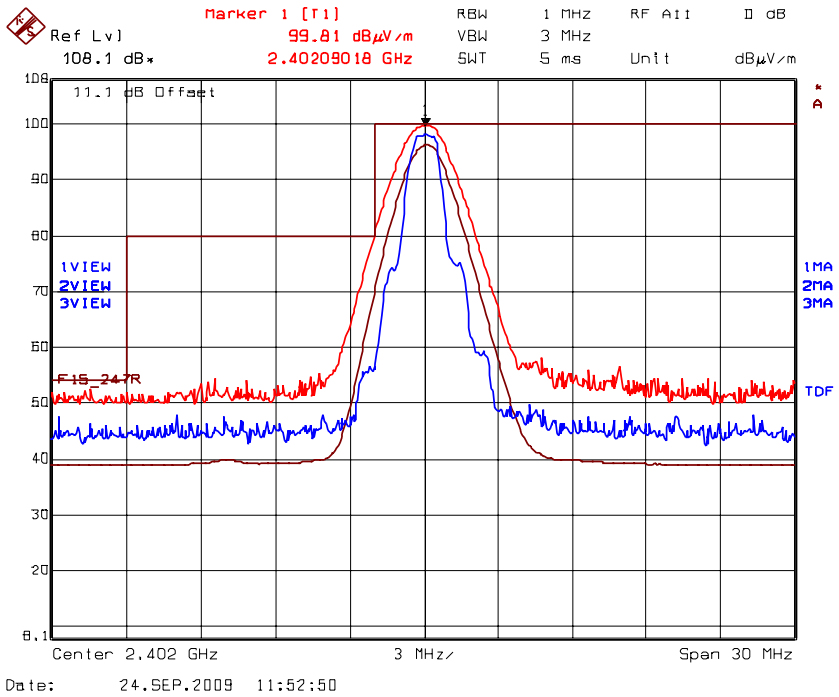


Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 300 kHz, VBW= 1 MHz
Trace 3: RBW= 1 MHz, VBW= 10 Hz

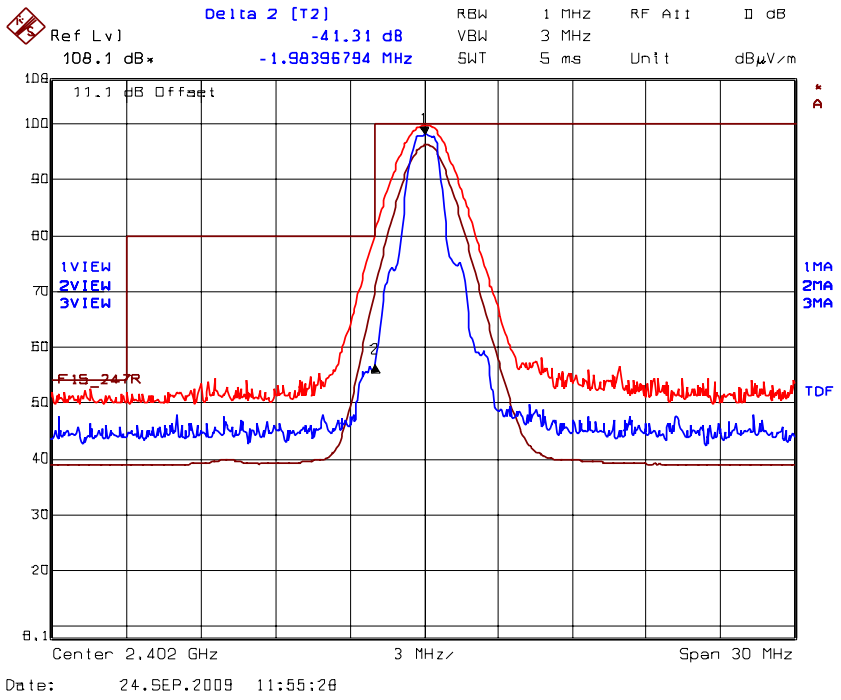


Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 300 kHz, VBW= 1 MHz, Delta (Peak to Band-Edge): -40.49dB
Trace 3: RBW= 1 MHz, VBW= 10 Hz
Peak Band-Edge at 2400 MHz: Peak= 108.64dBuV/m – 40.49dB= 68.15dBuV/m
(where limit is 88.64 dBuV/m)

Plot 5.12.4.1.22. Band-Edge RF Conducted Emissions
8DPSK Modulation, Continuous Mode, Low End of Frequency Band, Vertical

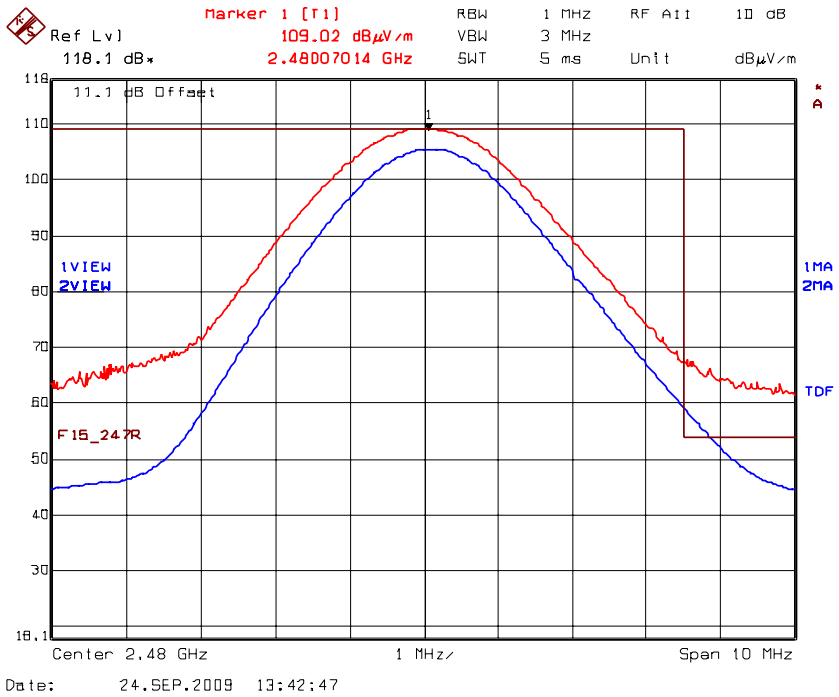


Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 300 kHz, VBW= 1 MHz
Trace 3: RBW= 1 MHz, VBW= 10 Hz

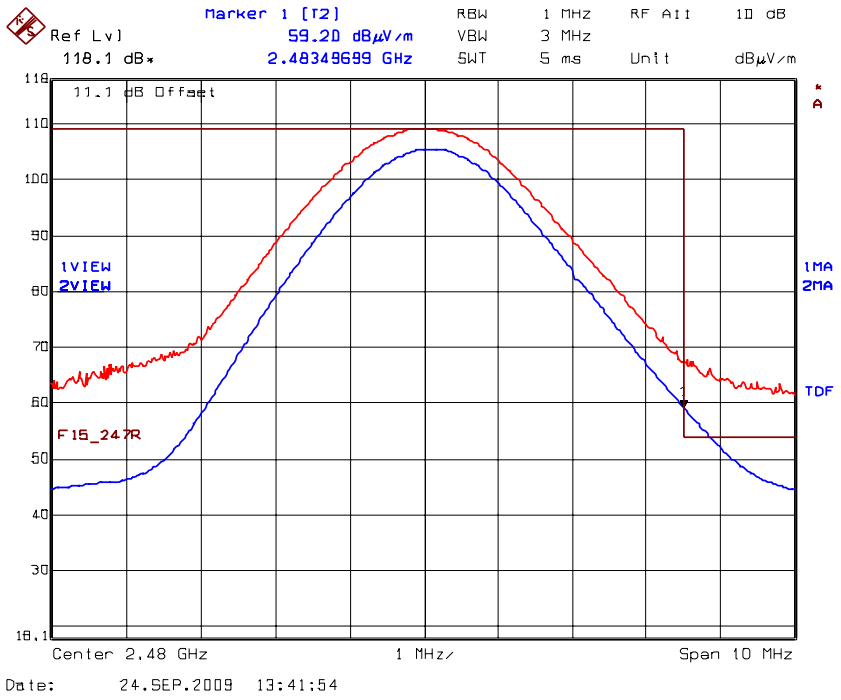


Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 300 kHz, VBW= 1 MHz, Delta (Peak to Band-Edge): -41.31dB
Trace 3: RBW= 1 MHz, VBW= 10 Hz
Peak Band-Edge at 2400 MHz: Peak= 99.81dBuV/m – 41.31dB= 59.50dBuV/m
(where limit is 79.81dBuV/m)

Plot 5.12.4.1.23. Band-Edge RF Conducted Emissions
8DPSK Modulation, Continuous Mode, High End of Frequency Band, Horizontal



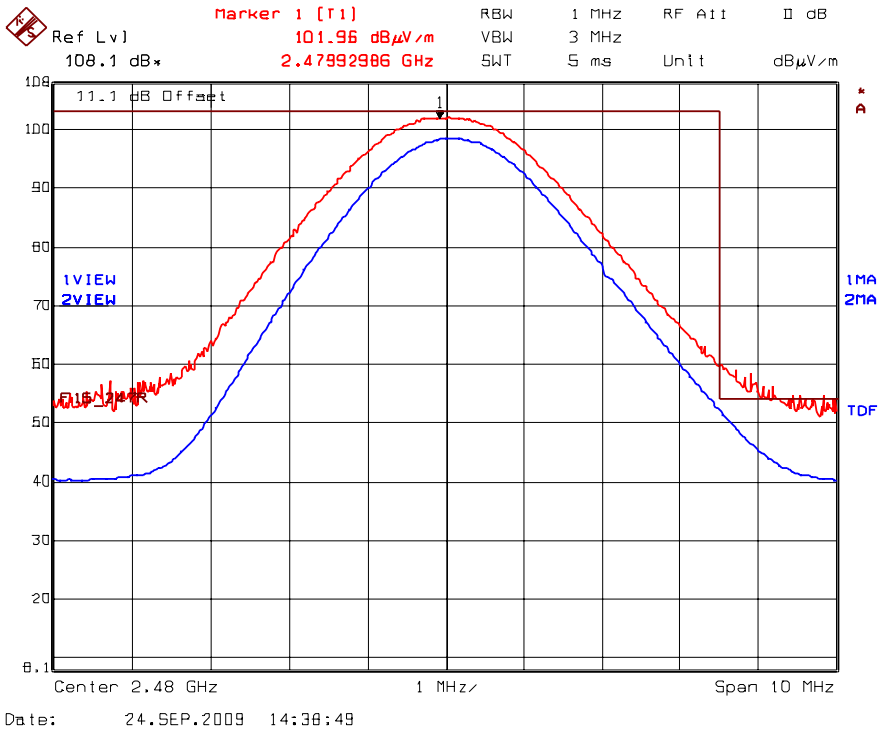
Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 1 MHz, VBW= 10 Hz



Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 1 MHz, VBW= 10 Hz

Duty Cycle Correction Factor: -20.6dB
RF average level 59.20dBµV/m – 20.6dB= 38.60dBµV/m (where limit is 54dBµV/m)

Plot 5.12.4.1.24. Band-Edge RF Conducted Emissions
8DPSK Modulation, Continuous Mode, High End of Frequency Band, Vertical



Trace 1: RBW= 1 MHz, VBW= 3 MHz
Trace 2: RBW= 1 MHz, VBW= 10 Hz

5.12.4.2. Spurious RF Radiated Emissions

Remark: *Duty cycle correction factor of -20.6 dB* was applied to determine RF average level per §15.35(c). See the manufacturer's declaration and analysis below for detail of duty cycle.

*"BT operates in the 2.4GHz ISM band on 79 1 MHz channels (CH0 = 2402MHz to CH78 = 2480MHz). The system is a frequency hopping system with 1600 hops per second which is equal to a channel dwell time of 1 / 1600 or 0.625 msec per hop. Under certain situations, the transmitter can remain on one channel for up to 5 time slots. Assuming a uniform distribution of hopping channels, the maximum number of times a channel can be hopped to during any 100 msec window is 3 times. Thus the maximum worst-case dwell time on one channel is 5 * 3 * 0.625 msec = 9.375 msec*

*Duty cycle correction factor = 20 * log (9.375 msec / 100 msec) = 20 * log (0.09375) = -20.6 dB"*

Remark: Measurements were performed with GFSK modulation only as it shall give the lowest duty cycle correction. See duty cycle measurement plots below.

Fundamental Frequency:	2402 MHz
Test Frequency Range:	30 MHz – 25 GHz

All emissions within 20 dB below the limit are recorded.

Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/ Fail
2402	100.94	--	V	--	--	--	--
2402	110.13	--	H	--	--	--	--
4804*	63.66	41.41	V	54*	80.94	-12.59	Pass
4804*	64.15	41.64	H	54*	80.94	-12.36	Pass
7206	61.86	37.82	V	54	80.94	-19.08	Pass
7206	53.14	24.96	H	54	80.94	-27.80	Pass
9608	59.99	32.59	V	54	80.94	-20.95	Pass
9608	57.52	28.76	H	54	80.94	-23.42	Pass
12010*	66.31	39.38	V	54*	80.94	-14.62	Pass
12010*	62.73	35.23	H	54*	80.94	-18.77	Pass
14412	59.61	26.79	V	54	80.94	-21.33	Pass
14412	57.46	23.40	H	54	80.94	-23.48	Pass
16814	64.32	32.74	V	54	80.94	-16.62	Pass
16814	65.15	34.52	H	54	80.94	-15.79	Pass
19216	51.94	18.07	V	54	80.94	-29.00	Pass
19216	52.20	18.61	H	54	80.94	-28.74	Pass
21618	53.16	18.84	V	54	80.94	-27.78	Pass
21618	52.85	17.79	H	54	80.94	-28.09	Pass

* Restricted band of operations; applies 15.209 limits.

Fundamental Frequency:	2441 MHz
Test Frequency Range:	30 MHz – 25 GHz

All emissions within 20 dB below the limit are recorded.

Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/ Fail
2441	101.56	--	V	--	--	--	--
2437	110.34	--	H	--	--	--	--
4882*	61.98	39.64	V	54*	81.56	-14.36	Pass
4882*	60.76	38.29	H	54*	81.56	-15.71	Pass
7323*	61.48	37.99	V	54*	81.56	-16.01	Pass
7323*	54.04	25.66	H	54*	81.56	-28.34	Pass
9764	58.99	31.11	V	54	81.56	-22.57	Pass
9764	57.02	27.94	H	54	81.56	-24.54	Pass
12205*	62.07	32.89	V	54*	81.56	-21.11	Pass
12205*	60.08	30.32	H	54*	81.56	-23.68	Pass
14646	58.39	22.28	V	54	81.56	-23.17	Pass
14646	56.50	24.14	H	54	81.56	-25.06	Pass
17087	63.64	31.62	V	54	81.56	-17.92	Pass
17087	66.76	35.71	H	54	81.56	-14.80	Pass
19528	56.13	22.13	V	54	81.56	-25.43	Pass
19528	53.44	19.58	H	54	81.56	-28.12	Pass
21969	54.54	20.19	V	54	81.56	-27.02	Pass
21969	53.47	19.10	H	54	81.56	-28.09	Pass

* Restricted band of operations; applies 15.209 limits.

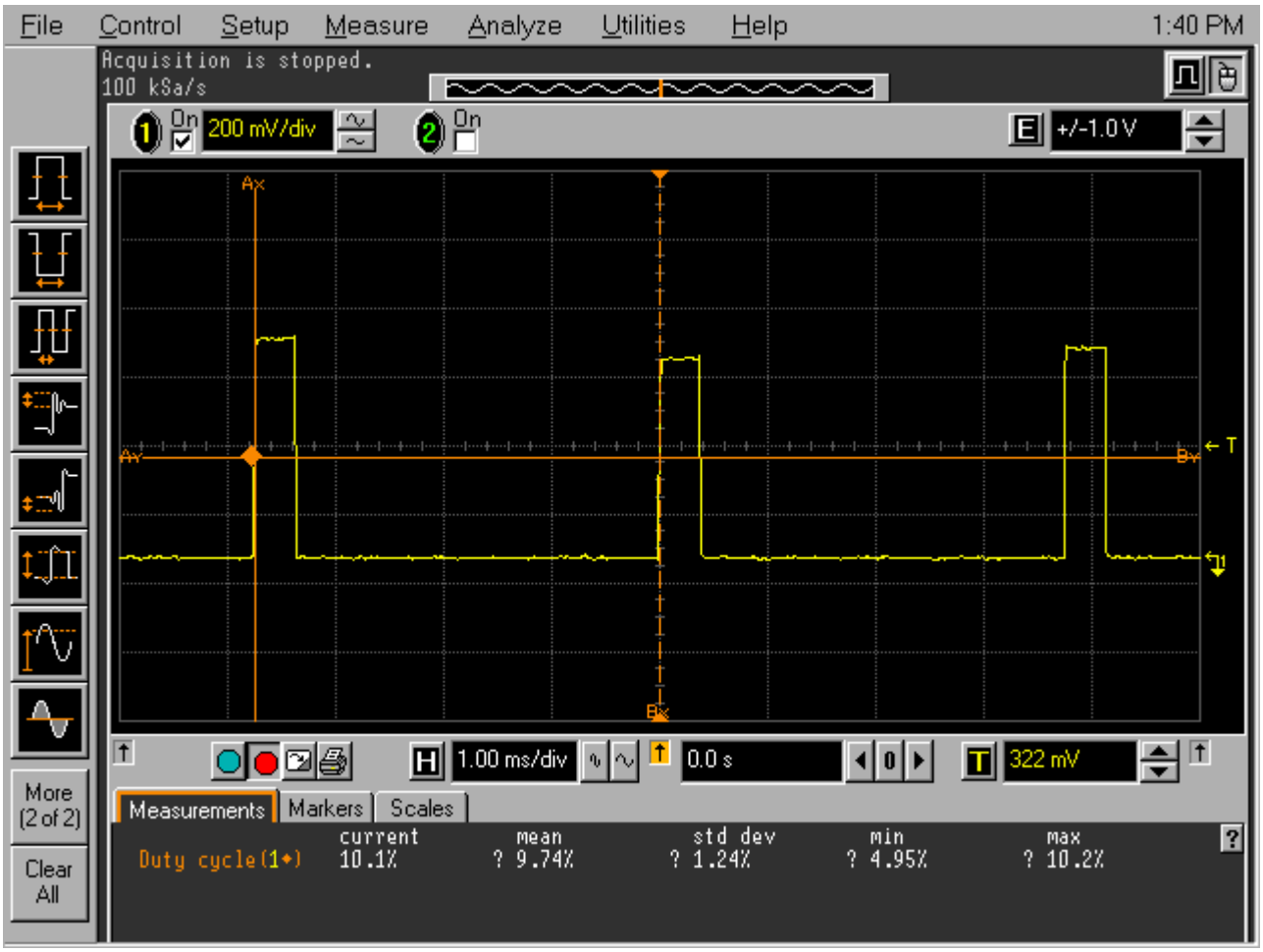
Fundamental Frequency:	2480 MHz
Test Frequency Range:	30 MHz – 25 GHz

All emissions within 20 dB below the limit are recorded.

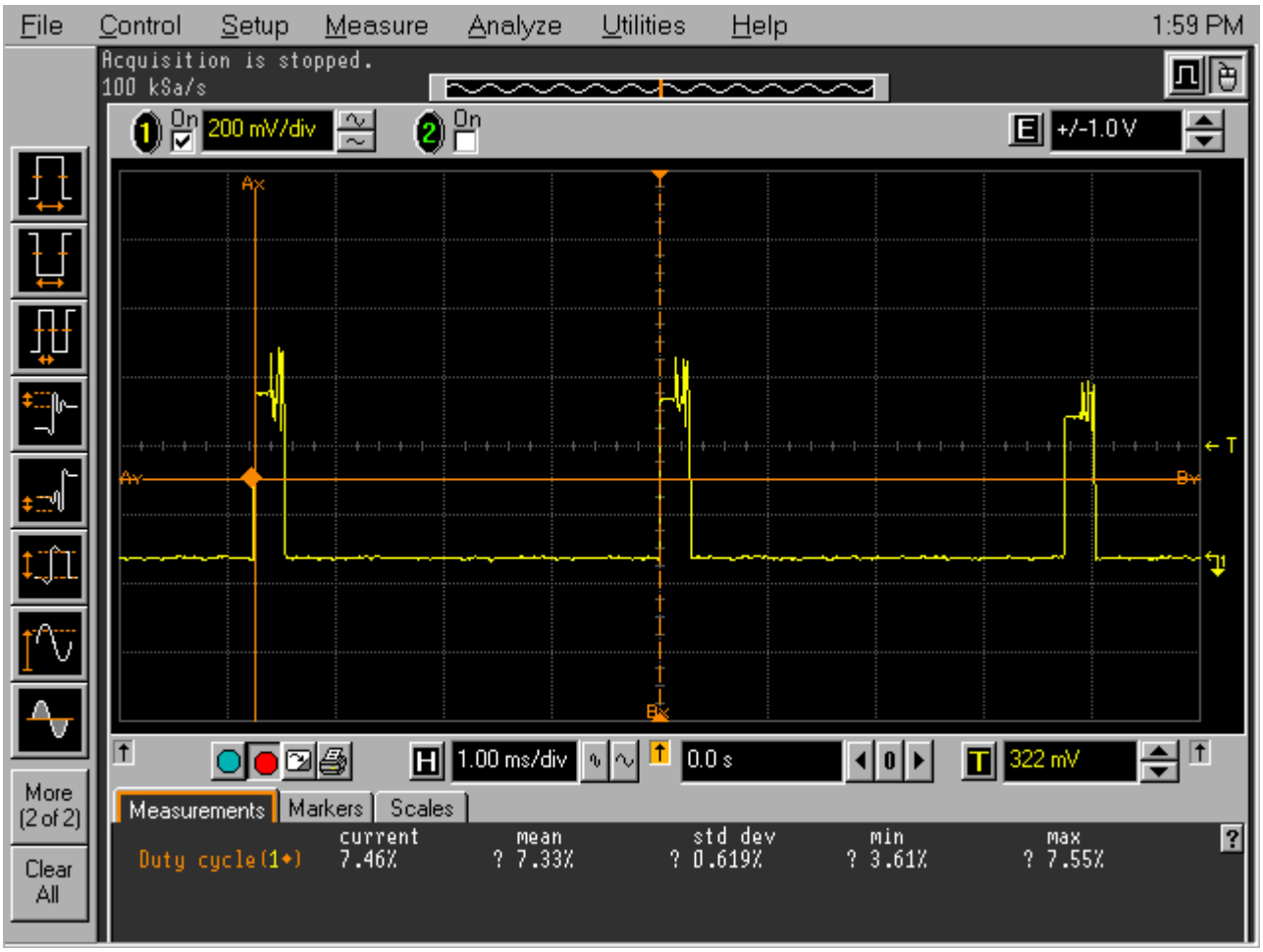
Frequency (MHz)	RF Peak Level (dBµV/m)	RF Avg Level (dBµV/m)	Antenna Plane (H/V)	Limit 15.209 (dBµV/m)	Limit 15.247 (dBµV/m)	Margin (dB)	Pass/ Fail
2480	102.70	--	V	--	--	--	--
2480	110.63	--	H	--	--	--	--
4960*	56.73	32.93	V	54*	82.70	-21.07	Pass
4960*	58.50	33.12	H	54*	82.70	-20.88	Pass
7440*	62.61	38.51	V	54*	82.70	-15.49	Pass
7440*	56.70	29.03	H	54*	82.70	-24.97	Pass
9920	53.84	19.79	V	54	82.70	-28.86	Pass
9920	53.14	19.12	H	54	82.70	-29.56	Pass
12400*	58.54	24.92	V	54*	82.70	-29.08	Pass
12400*	58.82	27.95	H	54*	82.70	-26.05	Pass
14880	55.57	22.65	V	54	82.70	-27.13	Pass
14880	56.77	22.83	H	54	82.70	-25.93	Pass
17360	63.45	29.56	V	54	82.70	-19.25	Pass
17360	68.74	37.03	H	54	82.70	-13.96	Pass
19840	52.94	19.08	V	54	82.70	-29.76	Pass
19840	52.78	18.66	H	54	82.70	-29.92	Pass
22320	53.63	20.03	V	54	82.70	-29.07	Pass
22320	52.91	18.41	H	54	82.70	-29.79	Pass

* Restricted band of operations; applies 15.209 limits.

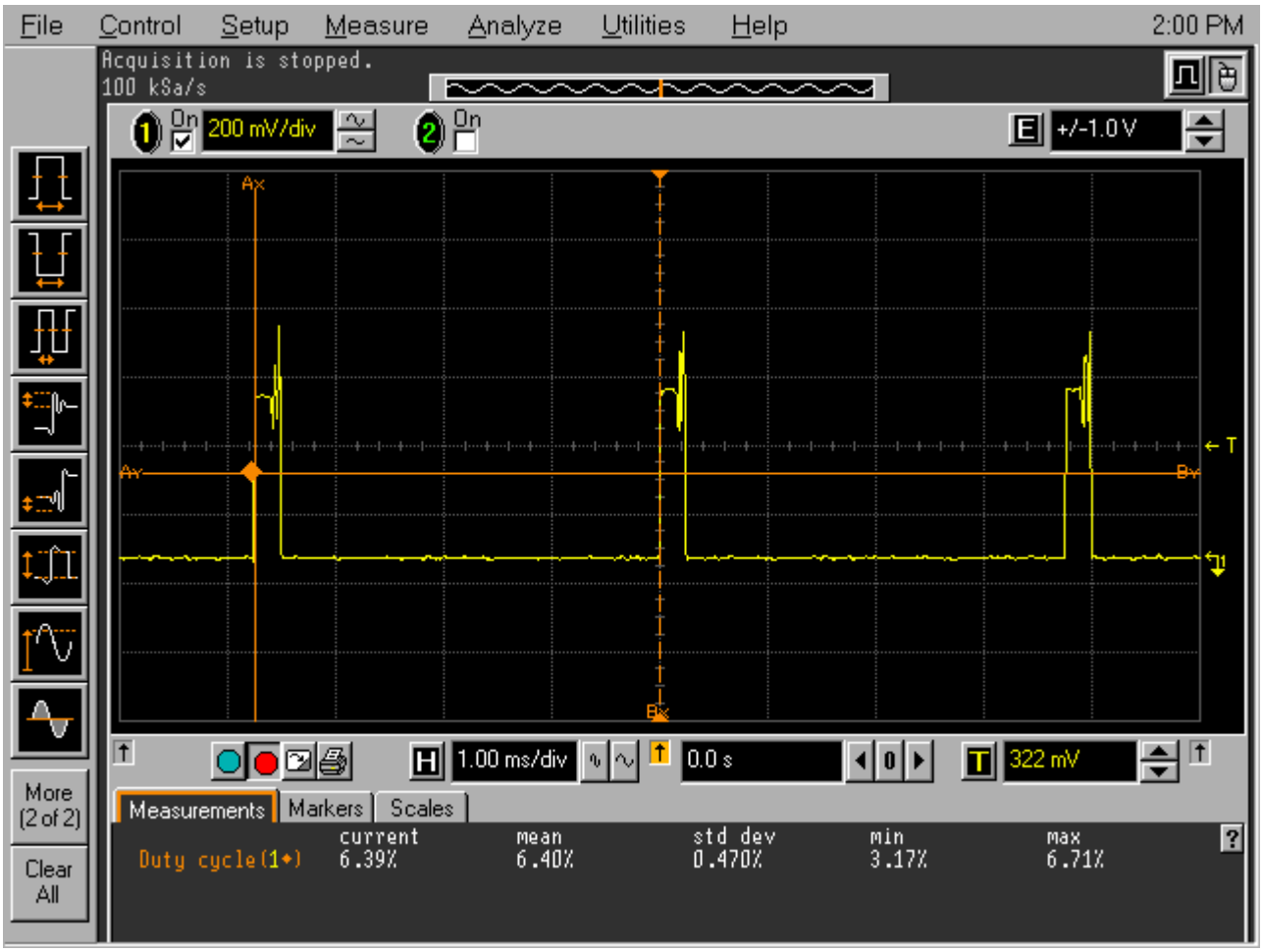
Plot 5.12.4.2.1. Duty cycle measurement, GFSK modulation, Hopping mode
20 * log (9.74 / 100) = -20.23 dB



Plot 5.12.4.2.2. Duty cycle measurement, π/4 DPQSK Modulation, Hopping mode
20 * log (7.33 / 100) = -22.70 dB



Plot 5.12.4.2.3. Duty cycle measurement, 8DPSK Modulation, Hopping mode
20 * log (6.40 / 100) = -23.88 dB



5.13. POWER SPECTRAL DENSITY [§ 15.247(e)]

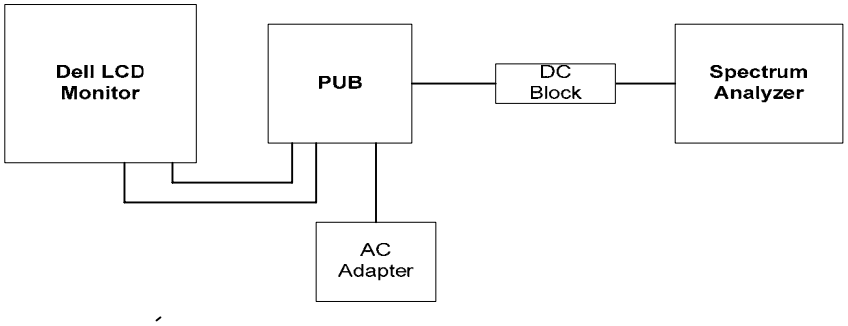
5.13.1. Limit(s)

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

5.13.2. Method of Measurements

KDB Publication No. 558074: Guidance on Measurements for Digital Transmission Systems (47 CFR 15.247), PSD Option 2 method.

5.13.3. Test Arrangement



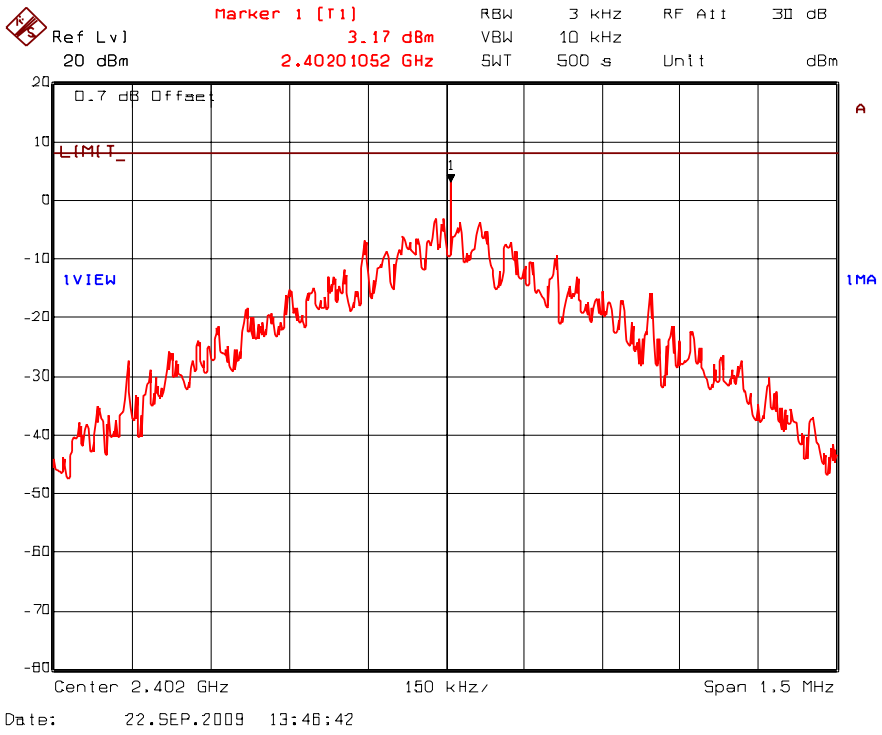
5.13.4. Test Data

Remark: Measurement method: Power spectral density (PSD) Option 2.

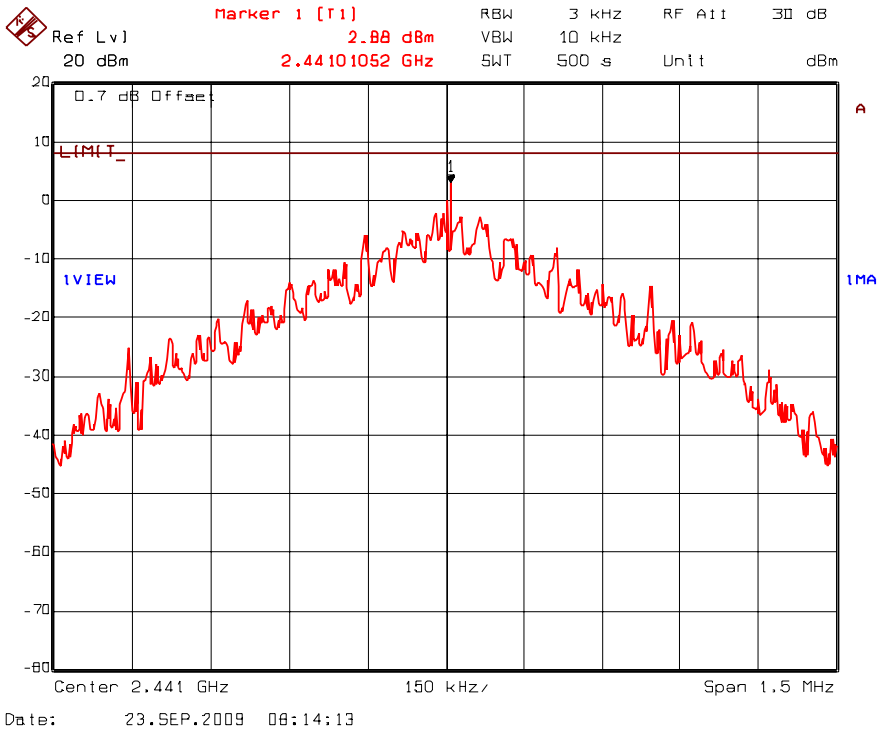
Frequency (MHz)	Modulation	*PSD in 3 kHz BW (dBm)	Limit (dBm)	Margin (dB)	Comments (Pass/Fail)
2402	GFSK	3.17	8.0	-4.83	Pass
2441	GFSK	2.88	8.0	-5.12	Pass
2480	GFSK	4.37	8.0	-3.63	Pass
2402	π/4-DQPSK	1.76	8.0	-6.24	Pass
2441	π/4-DQPSK	4.66	8.0	-3.34	Pass
2480	π/4-DQPSK	5.34	8.0	-2.66	Pass
2402	8DPSK	-1.05	8.0	-9.05	Pass
2441	8DPSK	1.00	8.0	-7.00	Pass
2480	8DPSK	4.51	8.0	-3.49	Pass

*See the following plots for measurement details.

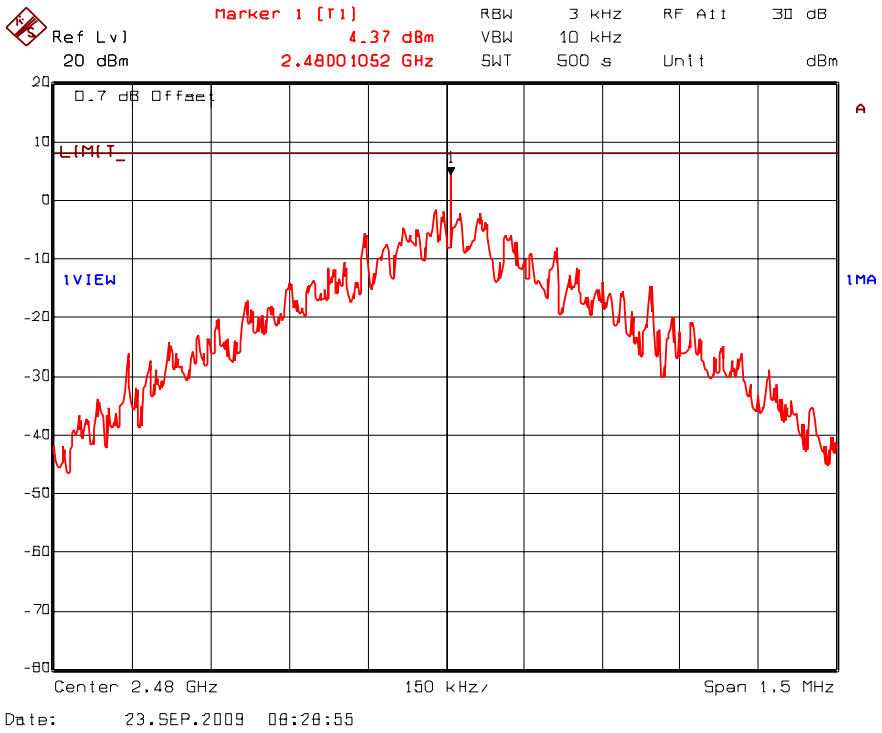
Plot 5.13.4.1. Power Spectral Density
Frequency: 2402 MHz, GFSK Modulation



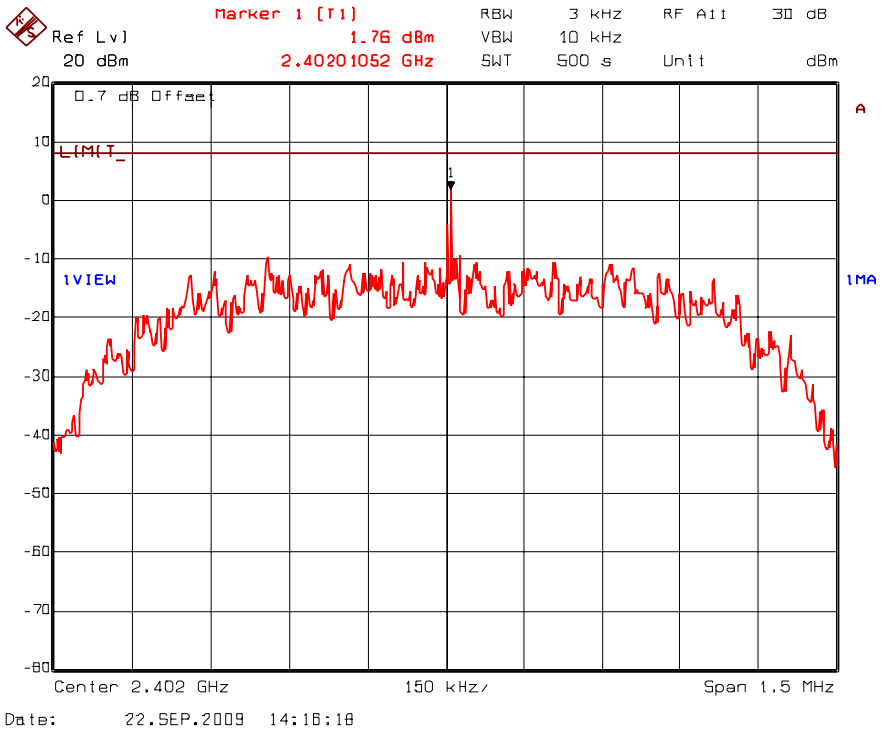
Plot 5.13.4.2. Power Spectral Density
Frequency: 2441 MHz, GFSK Modulation



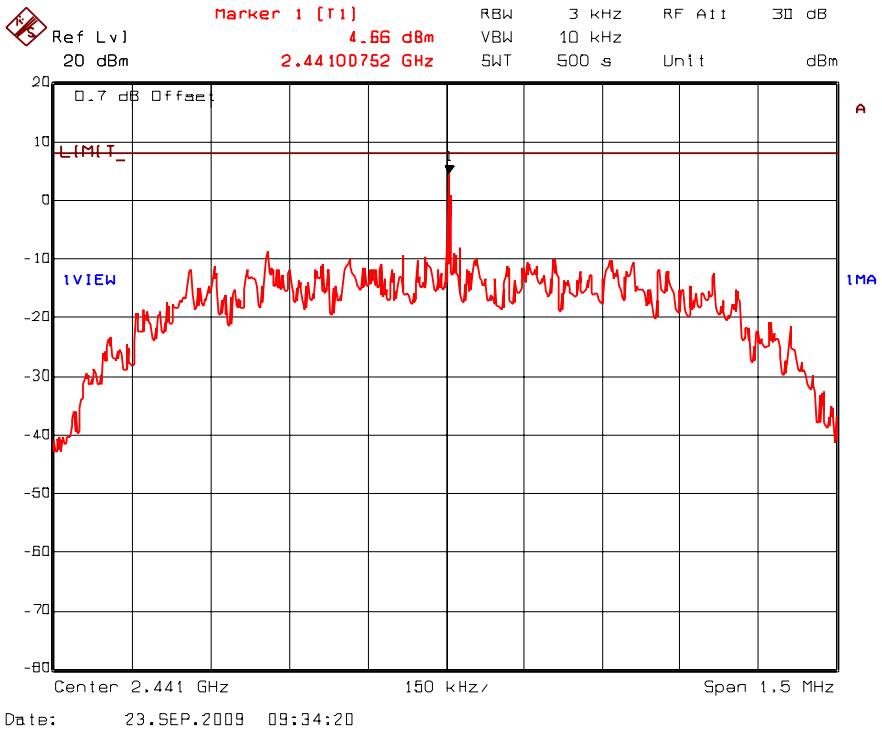
Plot 5.13.4.3. Power Spectral Density
Frequency: 2480 MHz, GFSK Modulation



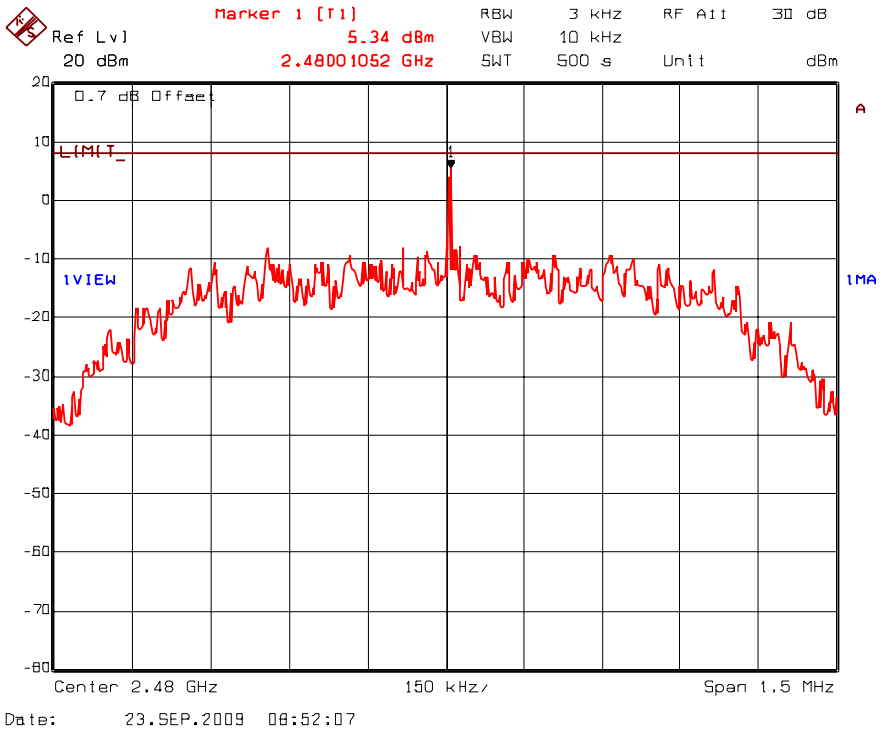
Plot 5.13.4.4. Power Spectral Density
Frequency: 2402 MHz, π/4 DPQSK Modulation



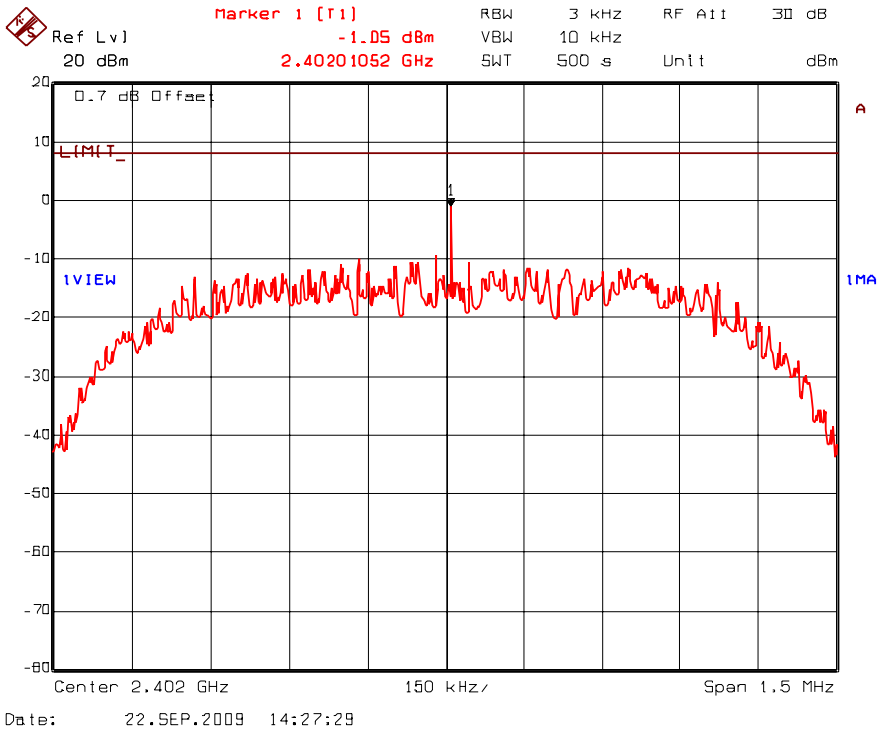
Plot 5.13.4.5. Power Spectral Density
Frequency: 2441 MHz, π/4 DPQSK Modulation



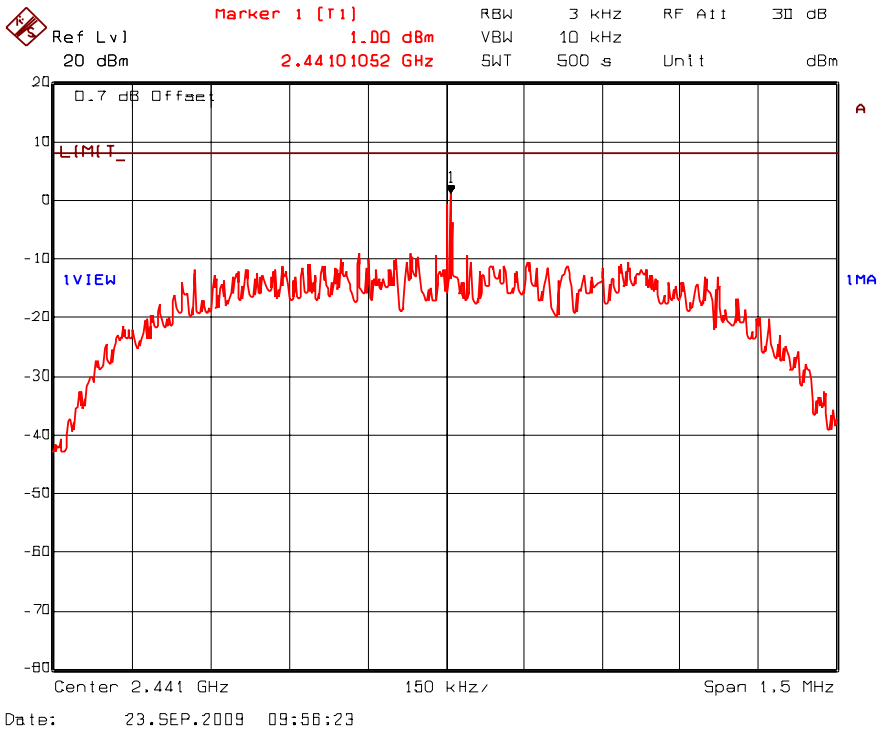
Plot 5.13.4.6. Power Spectral Density
Frequency: 2480 MHz, π/4 DPQSK Modulation



Plot 5.13.4.7. Power Spectral Density
Frequency: 2402 MHz, 8DPSK Modulation



Plot 5.13.4.8. Power Spectral Density
Frequency: 2441 MHz, 8DPSK Modulation



Plot 5.13.4.9. Power Spectral Density
Frequency: 2480 MHz, 8DPSK Modulation

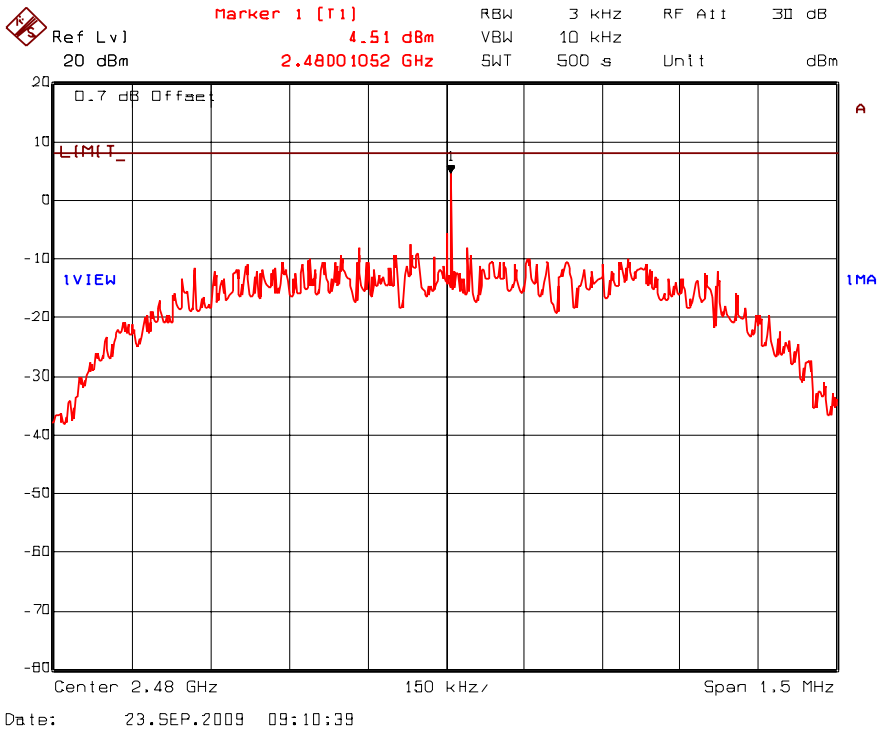


EXHIBIT 6. Test Equipments List

Test Instruments	Manufacturer	Model No.	Serial No.	Frequency Range	Cal. Due Date
Spectrum Analyzer	Rohde & Schwarz	FSEK30	100077	20 Hz – 40 GHz with external mixer	Aug 10, 2010
Spectrum Analyzer	Rohde & Schwarz	ESU40	100037	20 Hz – 40 GHz	Feb 17, 2010
Amplifier	Hewlett Packard	8449B	3008A00769	1 – 26 GHz	Jun 1, 2010
Attenuator	Narda	4768-10	-	DC – 40 GHz	
Biconilog Antenna	EMCO	3142	1005	26 – 2000 MHz	Apr 18, 2010
DC Block	Hewlett Packard	11742A	12460	0.045 – 26.5 GHz	
EMI Receiver	Hewlett Packard	85462A	3650A00371	9 kHz – 6.5 GHz	Jan 5, 2010
High Pass Filter	K & L	11SH10-1000/T12000	4	Cut off 2.4 GHz	
Horn Antenna	EMCO	3115	5061	1 – 18 GHz	Sep 21, 2010
L.I.S.N.	EMCO	3825/2	8907-1531	10 kHz – 100 MHz	Mar 28, 2010
RF Filter Selection	Hewlett Packard	85460A	3330A00149		Jan 5, 2010

EXHIBIT 7. MEASUREMENT UNCERTAINTY

The measurement uncertainties stated were calculated in accordance with the requirements of NIST Technical Note 1297 and NIS 81 (1994)

7.1. LINE CONDUCTED EMISSION MEASUREMENT UNCERTAINTY

CONTRIBUTION (Line Conducted)	PROBABILITY DISTRIBUTION	UNCERTAINTY (dB)	
		9-150 kHz	0.15-30 MHz
EMI Receiver specification	Rectangular	±1.5	±1.5
LISN coupling specification	Rectangular	±1.5	±1.5
Cable and Input Transient Limiter calibration	Normal (k=2)	±0.3	±0.5
Mismatch: Receiver VRC $\Gamma_1 = 0.03$ LISN VRC $\Gamma_R = 0.8$(9 kHz) 0.2 (30 MHz) Uncertainty limits $20\text{Log}(1\pm\Gamma_1\Gamma_R)$	U-Shaped	±0.2	±0.3
System repeatability	Std. deviation	±0.2	±0.05
Repeatability of EUT	--	--	--
Combined standard uncertainty	Normal	±1.25	±1.30
Expanded uncertainty U	Normal (k=2)	±2.50	±2.60

Sample Calculation for Measurement Accuracy in 450 kHz to 30 MHz Band:

$u_c(y) = \sqrt{\sum_{I=1}^{m} u_i^2(y)} = \pm \sqrt{(1.5^2 + 1.5^2)/3 + (0.5/2)^2 + (0.05/2)^2 + 0.35^2} = \pm 1.30$ dB

$U = 2u_c(y) = \pm 2.6$ dB

7.2. RADIATED EMISSION MEASUREMENT UNCERTAINTY

CONTRIBUTION (Radiated Emissions)	PROBABILITY DISTRIBUTION	UNCERTAINTY (± dB)	
		3 m	10 m
Antenna Factor Calibration	Normal (k=2)	±1.0	±1.0
Cable Loss Calibration	Normal (k=2)	±0.3	±0.5
EMI Receiver specification	Rectangular	±1.5	±1.5
Antenna Directivit	Rectangular	+0.5	+0.5
Antenna factor variation with height	Rectangular	±2.0	±0.5
Antenna phase center variation	Rectangular	0.0	±0.2
Antenna factor frequency interpolation	Rectangular	±0.25	±0.25
Measurement distance variation	Rectangular	±0.6	±0.4
Site imperfections	Rectangular	±2.0	±2.0
Mismatch: Receiver VRC $\Gamma_1 = 0.2$ Antenna VRC $\Gamma_R = 0.67$(Bi) 0.3 (Lp) Uncertainty limits 20Log(1±$\Gamma_1\Gamma_R$)	U-Shaped	+1.1 -1.25	±0.5
System repeatability	Std. Deviation	±0.5	±0.5
Repeatability of EUT		-	-
Combined standard uncertainty	Normal	+2.19 / -2.21	+1.74 / -1.72
Expanded uncertainty U	Normal (k=2)	+4.38 / -4.42	+3.48 / -3.44

Calculation for maximum uncertainty when 3m biconical antenna including a factor of k = 2 is used:

$U = 2u_c(y) = 2x(+2.19) = +4.38$ dB And $U = 2u_c(y) = 2x(-2.21) = -4.42$ dB